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Better Crude Oil Prices Expected Soon

Highest production in 1931, week ending Aug. 8, average daily output 2,551,807 bbls. Peak of U. S. production, week ending Aug. 24, 1929, average 2,975,435 bbls.

Increase in Mid-Continent Probable Within Six Weeks. Strengthening of Gasoline Market Important Factor

By Andrew M. Rowley

Lowest daily average crude oil production in the United States during 1931 was for week ending Sept. 5 with average output of 1,736,007 bbls.

Crude oil prices in the Mid-Continent area will be increased within the next six weeks according to present indications. Further strengthening of the gasoline market is an important factor and has influenced to an extent the spread of a feeling of conservative optimism throughout all branches of the industry. Crude oil producers and refiners are realizing more and more the futility of trying to operate on the low price basis which obtained during all of last year. A better price level can be made the basis of operations just as easily as the unprofitable level which has been maintained for so long. Prices were much higher when production was greater and consumption less. Price cutters were largely responsible for the low price level of last year. The industry should exert every effort to prevent a lowering of prices to the point where no one can operate except at a loss. Several large refiners have been lukewarm to such efforts in the past and reductions in price to procure gallonage have resulted.

The crude oil production situation continues favorable. An order placing a limit of 325,000 barrels daily, regardless of the number of completions, is effective in East Texas and the output of other areas will not be increased very much. Improved weather conditions throughout the country will stimulate consumption and the demand for domestic crude oil during April probably will average at least 150,000 barrels daily more than production.

The trend of sentiment towards the outlook is indicated by the action of several large, integrated companies, who have made, or are making, surveys of the crude oil production status. These companies are endeavoring to ascertain as nearly as possible what production may be expected from present producing fields. Surveys already completed are reliably reported as showing there is not the excess quantity of crude oil available that many thought.

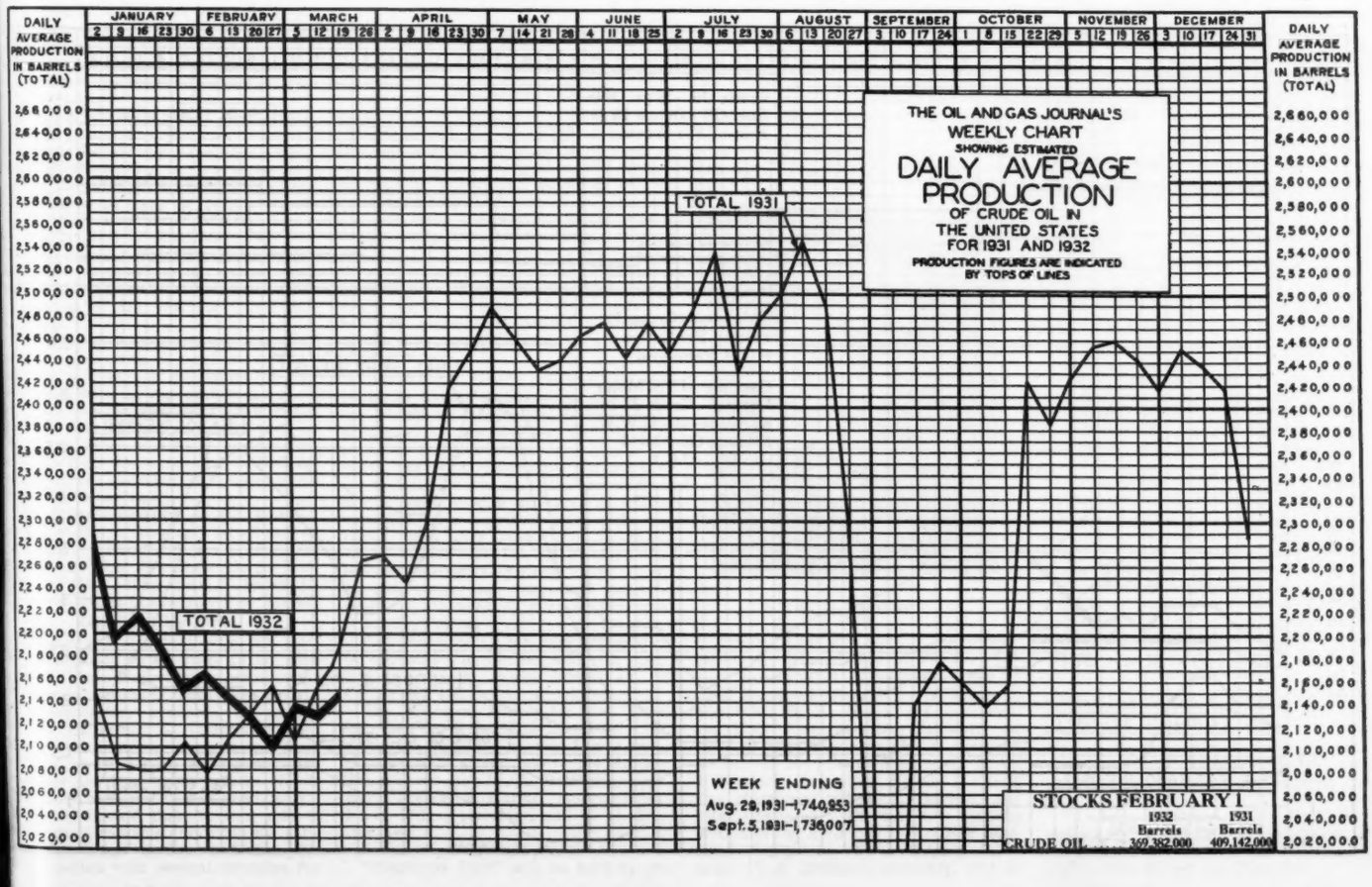
The industry soon will be on the road to prosperity if refiners continue their efforts to maintain a better price level and do all in their power to prevent cutting quotations under that level.

PRODUCTION IN THE UNITED STATES

Estimated daily average production of crude oil in the United States for the week ended March 12, and a comparison with the previous week, follows:

	Mar. 12	Mar. 5
Oklahoma—		
Oklahoma City	93,485	93,165
Seminole-St. Louis	119,510	118,435
Remainder of State	205,940	206,780
Total Oklahoma	418,935	418,380
East Texas—		
Kilgore	100,204	97,765
Lathrop	116,845	110,469
Joiner	106,563	101,685
Total East Texas	323,612	309,919
West Texas	182,076	177,563
North Central Texas	71,712	70,785
Texas Panhandle	47,685	50,708
East Central Texas	55,178	54,847
Gulf Coast—Texas	101,564	104,032
Southwest Texas	58,445	57,352
Total all Texas	840,272	825,206
Kansas	99,415	101,385
North Louisiana	28,245	27,905
Gulf Coast—Louisiana	26,556	27,116
Arkansas	34,180	34,020
Eastern Fields	115,000	115,000
Rocky Mountain Area	82,842	84,206
California—		
Santa Fe Springs	66,450	65,000
Long Beach	79,500	78,750
Playa Del Rey	19,500	19,750
Elwood	16,750	16,650
Kettleman Hills	60,000	60,000
Remainder of State	263,300	258,100
Total California	505,500	498,250
Total United States	2,150,945	2,131,468

→ Increase, 19,477 Bbls. Daily ←



Oklahoma Gasolines Continue Advance

Both Refinery Grades and Natural Gasolines Higher. Stabilized Grades of Latter Important Competitive Factor

By C. O. Willson

The gasoline market in Oklahoma (Group 3) during the past week continued to show strength. The U. S. Motor gasoline of no octane rating advanced one-fourth cent to a low of 3½ cents the first of the week. The 57-65 octane U. S. Motor was selling at a low of 3⅞ cents and 65 and above at 4⅛ cents. The higher gravity gasolines were also from one-eighth to one-fourth cent higher than the quotations of a week previous.

Natural gasolines gave their first indication of strength the latter part of last week in response to steady buying. The 26-70 grade advanced to a low of 1⅝ cents on Tuesday with some sales at 1¾ cents. Sellers were predicting additional advances before the end of the week.

The remainder of the refined market was steady. Buyers of kerosene, tractor fuels, furnace oils and all low cold test grades of fuel oils did not find any excess material in Oklahoma although it was claimed that one or more of these products were weak in some of the areas competing with Group 3. Manufacturers of lubricating oils were maintaining prices and some improvement in inquiries was noted by Oklahoma manufacturers of wax.

Those who are hoping for a gradual recovery in gasoline markets over the next few weeks were for the most part encouraged by the developments of the past week. Buying of refinery gasolines on Monday and Tuesday at the new prices was not as heavy as many of the trade expected but it was believed that the quotations would be well established by the end of the week. Buyers who have had their own way in gasoline markets over the greater part of the past two years, naturally are skeptical of any advances and are holding off their buying as much as possible.

Some Liquidation

As prices have advanced over the past three weeks there has been some liquidation of stocks by a few refiners and it is expected that the sellers will have to cope with the same situation in the natural gasolines if quotations continue to advance. Some of the liquidation is coming from refiners whose plants are shut down. The gasoline was stored during the winter months when prices were lower than they are now. The necessity of securing cash to meet current obligations apparently is a factor in some of these liquidations. Other refiners point out that these liquidations coming at this time will materially strengthen the position of gasoline for the spring and summer months.

Natural Gasoline Competition

In addition to the refinery liquidation, the competition of stabilized natural gasolines is also becoming more and more a factor in the refinery market. Although most manufacturers are endeavoring to obtain at least the current quotations for U. S. Motor gasolines, in their sales of stabilized natural gasolines, reports of the past week indicated that some buyers were persuaded to buy due to lower prices. This inevitable competitive situation has been pointed out from time to time in these columns. Natural gasolines manufacturers forced to sell their usual grades of natural gasolines under 1½ cents per gallon have been compelled to stabilize their products for the purpose of obtaining prices more in line with the refinery market.

Prices on these low vapor pressure grades of natural gasoline vary over a price range of 2 cents. Sales of 10-pound material with a gravity under 80 and an endpoint under 350 have been reported as high as 5 cents per gallon. Some manufacturers have been able to build up a substantial business in these stabilized motor fuels, the jobber usually selling the product at his stations at a 2 or 3-cent premium. The bulk of the stabilized natural gasoline now available to the trade as finished motor fuel is being offered around 3 cents a gallon and it is this product which is in direct competition with U. S. Motor gasoline and the higher gravity grades of refinery gasolines. With vapor pressures under 16, low distillation range and an octane rating usually running between 60 and 70, the natural gasoline manufacturers have quality as well as price to offer the buyers. Some of the largest manufacturers have shifted a substantial part of their production to these stabilized grades. As long as the 30 to 18-pound vapor pressure grades stay under 2 cents

(Continued on Page 88)

REFINED MARKET BAROMETER

The few price changes reported in refinery tank car prices over the past week were generally upward. Refinery gasolines joined with natural gasolines continued to advance in the Mid-Continent and Middle West and in other areas gasoline quotations were generally firm. Cold weather over a large part of the country has postponed the end of the furnace oil season and orders are being placed with refiners for immediate shipment of distillates. The expected passage of the excise bill taxing imports has brought a better feeling in regard to fuel oil and gas oil quotations at Coastal points. The interior market on these products is also steady. Some advances in cylinder stocks became effective at eastern refineries. Wax prices advanced sharply at East Coast refineries.

Mid-Continent—Refinery gasolines and natural gasolines continue advance. Good demand for kerosene, tractor fuel and furnace oil at firm prices. Fair to strong movement of industrial fuels. Other products unchanged.

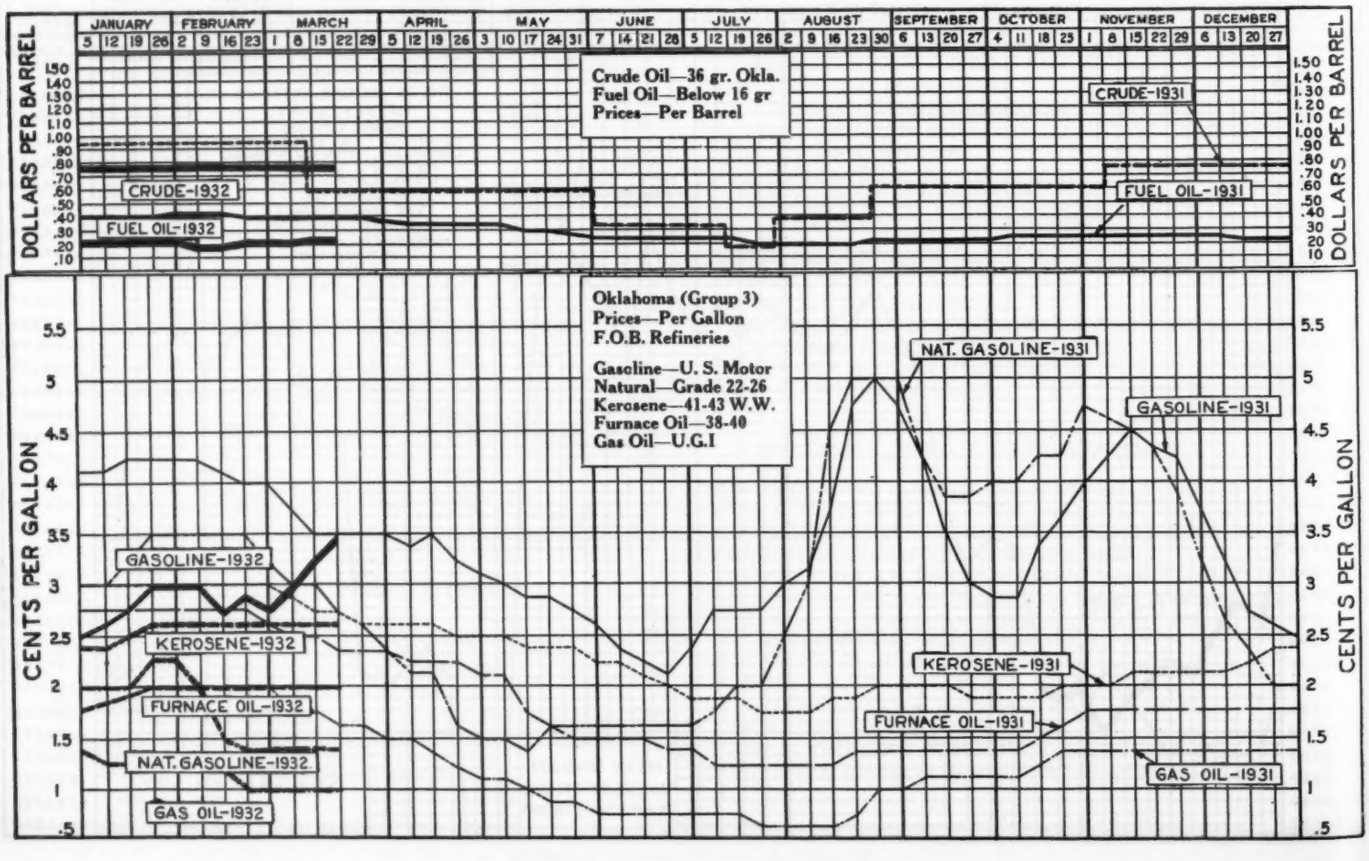
East Coast—Contracts closed for delivery of California gasoline. Cold weather stimulates kerosene and furnace oil demand. Better buying of cylinder oils at higher prices. Improvement in market sentiment regarding future price trends of bunker fuel oil and gas oil. Advance in all grades of paraffin wax.

Pennsylvania—Gasoline and kerosene market unchanged. Advances in some grades of steam refined stocks and bright stocks.

California—More inquiries for fuel oil. Refiners sell gasoline on contracts for East Coast delivery. Prices unchanged.

Gulf Coast—Domestic market quiet with few export inquiries. Prices unchanged.

Chicago—Better feeling regarding gasoline and prices advance. Special naphthas firm. Kerosene strong. Better demand for industrial fuels.



Engineers Discuss Pipe Line Problems

Meeting Under Auspices of A. S. M. E. Develops Interesting Facts Concerning Transportation of Crude Oil and Gasoline

By L. G. E. Bignell
Petroleum Engineering Editor

In a meeting marked by the large audience and the interesting discussion of papers presented, the Petroleum Division of the Mid-Continent section of the American Society of Mechanical Engineers carried on in Tulsa on March 10. This meeting was devoted to a presentation of nine prepared papers upon pipe line subjects, and if it may be taken as a criterion of the future possibilities along this line of discussion, it indicates most clearly that this field offers exceptional opportunities for the engineer.

In his opening address, William G. Heltzel, general superintendent of the Stanolind Pipe Line Co., Tulsa, and head of the Petroleum Division of the A.S.M.E., stated that the type of papers for future meetings will mark the change in technique in pipe line design and practice. In the past there has been a similarity of papers, presented largely because the type of work engaged in by the engineers has been along general lines, but new developments in the industry and the application of new types of equipment is broadening their scope of activity and will afford possibilities in the future unthought of in the past.

Mr. Heltzel pointed out that the general tendency in all industries has been to mechanize operations and to this end machines have been developed to reduce the burden of man's work and reduce the hand work required to perform all operations, until now the country finds itself in the position of being able to produce an excess of all products with the minimum of laborers.

This has created a situation of unbalanced social and economic conditions and it will be the engineer's problem in the future to so correlate the use of machinery to the use of workers to prevent the condition of unemployment now existing. Machinery must be used freely but society must be adjusted to this condition to the end that all may enjoy the low priced commodities but at the same time all may be employed to permit a full distribution of the products of the machine age.

This general change will be applied to pipe line operations as much as to other branches of endeavor and while the tendency has been in the past to go more and more to automatic operation of pump stations, Mr. Heltzel indicated that in the future there will be a greater tendency to limit the expansion in that direction to the end that more men might be employed profitably.

Mr. Heltzel presided at the morning session of the meeting and introduced as first speaker Stanley Learned, engineer for the Phillips Petroleum Corp., Bartlesville, Okla., who read a paper on "Friction Losses in Gasoline Pipe Lines."

Gasoline Pipe Lines

Mr. Learned said that when his company started to make plans to lay pipe lines to convey gasoline a considerable distance, it was found there were no data upon such systems available. He made a trip to California to investigate such short lines as were in operation there carrying gasoline from refineries to the coast for the loading of tankers. While these lines were not of any great length, Mr. Learned said that he was able to secure much valuable data from the engineers in charge of them and that this data, together with general formulas for oil and water lines, led to the design of the gasoline pipe lines.

As hydraulics is not an exact science, but depends largely upon the results of actual use and experiments, it has been found that the use of formula for friction losses in water and oil lines does not apply strictly to the gasoline lines. The coefficient of friction seems to be the variable factor that has to be determined largely by experiment. The 4,000 miles of from 3 to 8-inch gasoline lines now in use in this country are rapidly furnishing the engineer with reliable data and it was suggested that a correlation of this data into practical formulas should properly be the work of the A.S.M.E.

At the close of Mr. Learned's presentation of his paper there was some discussion of the best means of arriving at coefficient factors for friction and the application of other hydraulic data to gasoline lines, and it was agreed that a committee for the A.S.M.E. should be appointed and take up this work at once. Mr. Heltzel assured the meeting that this would be done and it is anticipated that out of their work some very definite steps forward will be forthcoming.

Automatic Pump Stations

A. N. Horne, engineer, Empire Pipe Line Co., Bartlesville, Okla., and chairman for the Mid-Continent section of the A.S.M.E., read a paper on "Operations of Automatic Pumping Stations." He briefly reviewed the work of his company in developing this type of station, of which it now has two in daily operation, one at Vinton, Okla., and the other near

(Continued on Page 66)

A.S.M.E. PAPERS IN THIS ISSUE

Papers presented before meeting of the Petroleum Division of the American Society of Mechanical Engineers, Mid-Continent section, in Tulsa, March 10. These papers cover pipe line practice.

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California's Third Oil Exposition

Instructive Program and Exhibits Prepared for Coming Equipment and Engineering Show at Los Angeles

LOS ANGELES, Calif., Mar. 12.—At a time when efficiency in operation is of paramount importance, the third annual Oil Equipment and Engineering Exposition will present the latest developments in tools and machinery that will be of outstanding importance as means of increasing that desired efficiency. During the past year the manufacturers of oil equipment improved their designs to better meet the problems confronting the petroleum industry and are taking the opportunity to show their latest developments at the exposition which will be held at Alameda Boulevard and 131st Street, Los Angeles, from March 21 to 27, 1932.

Exhibits will include products and materials as well as tools and machinery for use in drilling, production, refining, natural gasoline manufacture, natural gas, pipe line and marketing. A separate division has been inaugurated for marketing and oil, greases and gasolines will be shown together with all types of equipment for their distribution from the refinery until they reach the consumer. Every facility for moving displays has been provided with adequate electric power, gas, water and compressed air conveniently arranged to operate any type of exhibit desired.

A formal opening has been arranged to be held at 2 p.m. of March 21, the opening date. Gov. James Rolph, Jr., of California, will deliver an address.

The "American Society for Steel Treating Day" will be Tuesday, March 22, when the members of the Los Angeles chapter will attend as representatives. The officers are: W. A. DeRidder, chairman; Thomas F. Hutton, vice chairman; D. C. Miller, secretary, and C. H. Dye, treasurer.

Engineers Day

"Engineers Day" will be held by the American Institute of Mining and Metallurgical Engineers Wednesday, March 23, at 2 p.m. The officers of the southern California section of the institute holding the meeting are: VanCourt Warren, chairman; H. Norton Johnson, vice chairman, and E. Huguen, secretary-treasurer. The officers of the Los Angeles section of the American Society of Civil Engineers are: A. L. Sonderegger, president; O. A. Stone, vice president, and Macy Jones, secretary-treasurer. Of the Los Angeles section of the American Society of Mechanical Engineers: R. R. Robertson, chairman; Ralph J. Reed, vice chairman, and J. A. Garrett, secretary-treasurer. Of the Los Angeles section of the American Institute of Electrical Engineers; P. S. Biegler, chairman; P. A. Dellinger, secretary, and A. P. Hill, assistant secretary. The Engineers Club of Los Angeles will participate and its officers are: Thurston H. Ross, president; Fred Garrison, vice president; W. W. Hurlbut, secretary, and Charles F. Howe, treasurer.

E. G. Lenzner

Three interesting papers will be presented at the A.I.M.E. meeting: "The Use of Water Table Data in Oil Exploration," by E. K. Soper, associate professor of geology of the University of California at Los Angeles; "The New Conception of Oil Production as Applied to the Santa Fe Springs Gas Case," by John F. Dodge, professor of petroleum engineering at the University of Southern California; and a resume by Stanley Herold of a paper entitled "Selection and Use of Screen Pipe," by Clifford Wilson.

"Natural Gasoline Day" will be Thursday, March 24, and will be featured by a meeting of the California Natural Gasoline Association, preceded by a dinner. The association has made extensive plans for the event and the work of its officers, O. C. Field, president; R. C. Wheeler, vice president, and Wallace McIlhany, has made possible a most instructive and entertaining program.

W. T. Mayer, engineer for the San Francisco headquarters of the Neilan Co., Ltd., will present a paper on "Regulation and Its Part in Liquefied Gas Plants."

Natural Gas

Natural gas men will be interested in the "Southern California Meter Association Day," Friday, March 25. The officers of the association are: P. W. Hill, president; L. P. W. Des Brisay, vice president; A. E. Madden, treasurer, and G. F. Duncan, secretary.

"American Welding Society Day," Saturday, March 26, will be in charge of the Los Angeles section. Its officers are:

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Pints, Inches, Bushels and "Decibles"

Engineers Have Evolved Simple Method of Calculating Transmission Loss of any Given Pipe Line Telephone Line

By L. E. Adler
Telephone Engineer, Magnolia Pipe Line Co.

Why the curious title? Perhaps you have already guessed it—just a way to drive home the thought that the decibel is not a complicated and mysterious symbol to be understood only by a "high-brow" mathematical mind, but is merely a standard of measurement with which any common or garden variety of telephone man can measure or calculate the various transmission losses which afflict telephone lines and apparatus.

Now, let us look at another word frequently used in speaking of telephone transmission, "attenuation." This is merely another word for "loss," meaning the process of tapering off; becoming less, and, to invert an old saying, "the last 40 miles are the hardest."

Now that we know that the decibel is the yardstick of transmission measurement, let us find out how to apply it and upon what it is based.

A quarter of a century ago, some clever engineer decided that it should be possible to measure the talking efficiency of telephone lines in much the same manner as the grocer weighs potatoes. So he evolved a unit known as the "standard mile," this being merely a method of comparing the loss of any given line with the loss caused by talking through a certain number of miles of Standard No. 19 gauge paper-insulated exchange cable. The standard mile of cable itself was assumed to have a loop resistance (both sides of line) of 88 ohms and a mutual capacity of .054 micro-farads. The term "mutual capacity" may be explained by comparing each of the two sides of a line with the two plates of a condenser. There are thus two major sources of loss in any line, one being the ohmic resistance of the wire, the other being the condenser effect of the two wires. The amount of energy absorbed or "short-circuited" by this condenser effect is in most cases greater than the loss caused by more resistance of the conductors. And, sad to say, this "capacity-loss" becomes greater in proportion to the resistance loss after certain of the larger sizes of wire are reached. Expressed in another manner, for example, a line constructed with No. 6 B&S gauge copper wire will reduce transmission loss only about one-fifth over a No. 8 line of equal length and pin spacing, although it contains 50 per cent more copper. For this reason, the major telephone companies find it much more economical to use smaller gauge wires and to "boost" or amplify the transmission by means of amplifying equipment located at strategic points along the line.

The Decibel

At a later period, the term "standard mile" was changed to the term "transmission unit" or "T.U." More recently, the transmission unit has been rechristened the "decibel" or "db" in honor to the memory of Alexander Graham Bell, the father of the Bell Telephone system.

In short, the decibel is merely a unit for expressing the ratio of loss between the amount of electrical energy transmitted and the amount received at the other end of the line. The change of volume caused by adding or subtracting one decibel from a given telephone connection represents the minimum amount of change which can be detected by the average human ear.

Now, we all know that different kinds and sizes of wire, as well as various types of equipment cause different values of transmission loss. Once knowing the loss per mile of decibels of each of the various kinds and gauges of wire and knowing the loss caused by various pieces of apparatus and equipment, it is a simple matter to calculate the transmission loss of any given line with its repeating coils, telephone, switchboards, composite sets or what not.

We have a chart (Figure No. 1) showing the loss in decibels of nearly every kind of line wire, cable and equipment in common use. With the aid of this chart it is a simple matter to calculate the transmission equivalent of any standard line. For example, let us consider the overall loss of a physical line, 300 miles long, constructed of No. 8 copper wire with standard D.P. insulators and pin spacing. A simplex telegraph line is superimposed, with two terminal and no intermediate Morse stations. Each end terminated in a magneto switchboard of the conventional type. All this is shown graphically in Figure No. 2, from which we can calculate the losses as follows:

	DB
300 miles of No. 8 wire—300×.056 db. ..	16.8
2 Simplex Rep. coils at .7 db each	1.4
2 PBX Cord circuits at .4 db each	.8
1 mile No. 19 Exchange cable	1.3
3 bridged phones (rec. on hook) at .1 db	.3
Total	20.6

Overall Transmission Limit

On the open wire line it will be noted that the wet weather figure has been used. This is always the best policy unless your line happens to traverse a desert. In addition, it is safe to assume that one or more of the bridged phones may occasionally have a receiver off the hook while the line is being used from end to end. Perhaps the reader has discovered a sure-fire method of eliminating these rubbernecks, but the writer frankly confesses defeat and suggests that at least 3 db loss be added for the contingencies.

By this time some one is ready to ask, "What is the overall transmission limit for a nonrepeatered telephone line?" As far as the oil and gas business is concerned, there will be as many different answers as there are T&T superintendents. The writer's conclusion in this respect is expressed in the following table, the product of some 20 years of transmission experience:

Gauge of wire (B&S)—	Maximum permissible length physical—circuits Copper	Copperweld (40%)	(Loop) Iron
No. 6 (162 mils. dia.)	520 miles	240 miles	113 miles
No. 8 (128.5 mils. dia.)	440 miles	186 miles	92 miles
No. 9 (114.9 mils. dia.)	365 miles	154 miles	82 miles
No. 10 (101.9 mils. dia.)	322 miles	127 miles	73 miles
No. 12 (80.8 mils. dia.)	240 miles	94 miles	64 miles

This table is at the best only a general guide, since the following factors of local conditions must be considered:

1. The amount of cable in the line.
2. The number of bridged phones.
3. Simplex repeating coils or composites.
4. P.B.X. and other equipment and line losses at either end.
5. The "noise-level" or amount of inductive disturbance.

In the table it has been assumed that all cable and equipment losses will total 6 decibels and that the noise-level is normal for a commercial circuit.

Measuring Transmission

Quite logically, the next question will be, "How can transmission loss be measured so one will know whether or not the line lives up to the calculations?" The answer is that transmission measuring sets are now available which measure the exact loss in decibels of any line, section of line or piece of apparatus. No longer is it necessary to count "1-2-3-4-5" first through a line loop, then through an artificial line in order to get a crude volume comparison. The more modern instruments are designed to read the loss directly from the scale of a meter calibrated in decibels, using a 1,000 cycle tone as the source of energy. The range of usefulness of these instruments is surprising. Defects such as short-circuited turns in ringers and voils, poor contacts in splices, switchboard plugs, etc., will show abnormal losses on a good transmission set even though the apparatus performs okeh as to signaling and other functions.

No article on telephone transmission would be complete without a few words concerning modern voice-amplifying equipment. It is a settled fact that even with the most approved form of outside plant construction and the most efficient phones and switchboards, many long distance routes, because of extreme distance or a conglomeration of equipment are incapable of delivering commercially satisfactory transmission.

Important Factors

Thus arises the question of how far one can talk before line amplifiers are really necessary. Perhaps the major value of this article is to enable the reader to find his own answer to this question, keeping in mind these factors:

1. Consider not merely the transmission loss on any one line, but the total overall loss between the two most widely separated points between which telephone service is needed. This may involve a

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FIGURE 1

TRANSMISSION EQUIVALENTS OF STANDARD TELEPHONE LINES AND APPARATUS LINES (12-FOOT PIN SPACING, NON-POLEPAIRS, 68° F.)

	Copper Dry	Copper Wet	40% Copperweld Dry	40% Copperweld Wet	Iron Dry	Iron Wet
No. 6 Physical (dia. in mils. 162)	.034	.046	.086	.090	.190	.205
No. 6 Phantom	.027	.035	.080	.084	.185	.199
No. 8 Physical (dia. in mils. 128.5)	.046	.056	.124	.130	.245	.265
No. 8 Phantom	.041	.049	.116	.122	.238	.256
No. 9 Physical (dia. in mils. 114.4)	.056	.066	.149	.158	.276	.296
No. 9 Phantom	.048	.057	.136	.148	.267	.282
No. 10 Physical (dia. in mils. 101.9)	.065	.075	.176	.188	.303	.325
No. 10 Phantom	.056	.064	.155	.167	.292	.310
No. 12 Physical (dia. in mils. 80.8)	.101	.116	.241	.255	.356	.379
No. 12 Phantom	.088	.100	.217	.234	...	...
No. 14 Physical (dia. in mils. 64.08)	.143	.165	.304	.322	...	...
No. 14 Phantom	.124	.158	.275	.293	...	...
No. 19 GA. Std. U.G. Cable	1.2					
No. 22 GA. Std. U.G. Cable	1.8					
No. 24 GA. Std. U.G. Cable	2.2					
No. 26 GA. Std. U.G. Cable	2.5					
No. 16 GA. Std. U.G. Cable	.73					
No. 13 GA. Std. U.G. Cable	.49					

COMMONLY USED APPARATUS

Type—	Loss
No. 76 SX or Phx. Rep. Coil	.7 (1-1)
Bridged 500w Drop	.3
Bridged 1,600w Ringer	.1
Bridged Telecode Relay 1,600w	.08
Terminal CX. Set	.3
Intermediate CX. Set	.3
2 M.F. Condenser (Series)	.1
1 M.F. Condenser (Series)	.2
Magneto Cord Circuit	.3

Type—	Loss Non-P.	Pad.
1 Bridged Phone off Hook	3	1.3
2 Bridged Phone off Hook	6	2.6
3 Bridged Phone off Hook	10	4.7
4 Bridged Phone off Hook	15	6.0
5 Bridged Phone off Hook	21	7.5
6 Bridged Phone off Hook	25	9.0
Non-Ind. Res. (Series) 100w	.8	
Non-Ind. Res. (Series) 200w	1.4	
Non-Ind. Res. (Series) 400w	2.6	
Non-Ind. Res. (Series) 800w	4.4	
Non-Ind. Res. (Series) 1,000w	5.1	
Non-Ind. Res. (Series) 2,000w	8.5	

—Courtesy Southern Electric & Transmission Co., Dallas, Tex

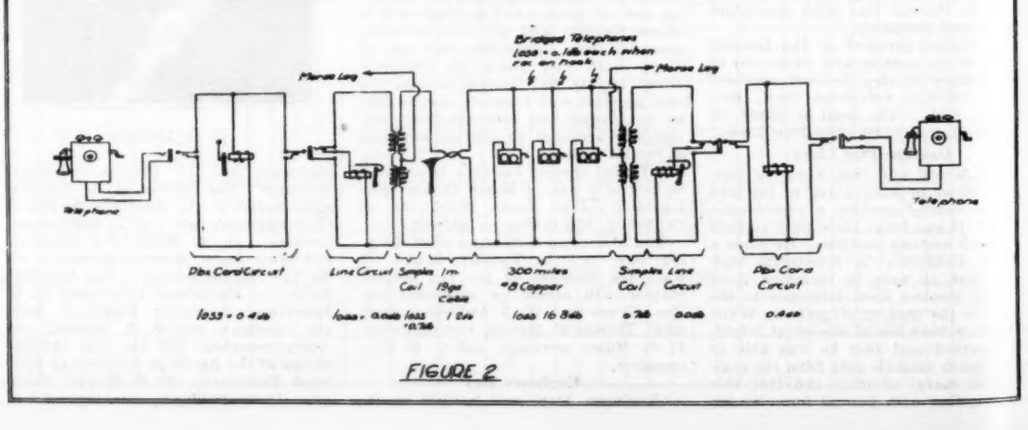

FIGURE 2

Iraq Pipe Line To Be Completed by 1935

Distance From Field to Sea About 700 Miles But With Y Will Be 1,200 Miles in Length. Ten and 12-inch Pipe to Be Used

With all the glamour and adventure opened up by Colonel Drake and continued through a seven-decade search for oil in many lands, despite the oil fever of early Pennsylvania and the Mid-Continent, the famous "golden lane" of Mexico, and the prolific floods of Oklahoma City and East Texas, no other territory is bound up in as colorful a web of Biblical history, desert seeps, wandering tribes, World War intrigue, international negotiation, extensive exploration, mad gushers, pipe line surveying, and just plain curiosity as Iraq—rightly called the world's oldest oil field.

After 20 years of negotiating, laborious exploration, and test drilling, the situation there has reached the stage where the petroleum industry is looking forward with mixed emotions to 1935, the date set in the agreement with the Iraq government for the completion of the projected pipe line. The world supply situation at that time, the problem of "getting business" for the line, recovering the heavy investment required for construction as well as for long and expensive exploration work, the question of just how prolific Mosul oil will eventually prove to be, the refining situation abroad and the development of other foreign fields—all these will have an important bearing on the answer to the Iraq conundrum in 1935. And all are uncertain factors.

Situation Today

As the situation stands today, production in Iraq cannot be expected to exceed the present annual output of 1,000,000 to 1,200,000 bbls. until the line is completed. The contemplated capacity of the underground carrier is approximately 30,000,000 bbls. a year, and the Iraq Petroleum Co. is now seeking to develop sufficient production to justify its construction.

At the present time, in accordance with the convention made last March between the government of Iraq and the Iraq Petroleum Co., Ltd., surveys were carried out between various points in the concession and the Mediterranean seaboard and the route of a Y-shaped line finally decided upon. H. S. Austin, builder of the Ajax pipe line in the United States and president of both the Ajax Pipe Line Co. and Tuscarora Oil Co., was called abroad to take charge of the construction work. Assisting him is Capt. M. Stuckey, formerly with the Andean Pipe Line Co. in Colombia.

As it is at present contemplated the line will start at Kirkuk. Two parallel cylinders of electrically welded steel, each 10 inches in diameter but expanding farther on to a 12-inch diameter, will stretch across the desert to Fataha on the Tigris River and from thence to Haditha on the Euphrates. There we come to the two arms of the "Y," for one outlet runs across British mandated territories through Rutba and Azrek to the seaport of Haifa on the Mediterranean. The second arm extends through French mandated Syria to the seaport of Tripoli by way of Abu Kemal, Palmyra and Homs. Except for a small section near the Jordan Valley on the southern branch, the same diameters of 10-inch and 12-inch will be utilized; in this valley smaller sized pipe will be required in order to handle the pressure head. The distance from Kirkuk to the Mediterranean is around 650 to 700 miles. With the bifurcation, there will be some 1,200 miles of pipe laid in all.

Rugged Job

Iraq affords a fascinating study, although a somewhat disquieting one for the pipe line engineer who must invade its rugged hills and trackless deserts and gamble with the uncertain disposition of wandering tribes. The foreign oil man coming into the country has the unplumbed psychology of the Arab to contend with, in addition to the equally unpredictable problems of the oil field. He must be a diplomat as well as a petroleum or pipe line engineer, and an accomplished one, for the Arab is suspicious of the motives of strangers, unaccustomed to organization, and impatient of authority.

There are few roads save those constructed by the oil companies, and no through highway exists across the desert to the Mediterranean. On the other hand, the surface of the desert is firm like a hard pebble pavement and free from sand dunes, so that motor cars can go almost anywhere in dry weather.

The country is not all desert. Mountain peaks rise as high as 10,000 feet in the northeastern part, and elevations in the north Arabian desert vary from 1,100 feet or more in the oil fields to 3,000 feet on the Arabian plateau, and as high as 2 miles in the mountains bordering the Mediterranean Coast.

The climate is semiarid, much like Imperial Valley in California, and one gasps in temperatures as high as 120 degrees in the shade during the hottest part of summer. But, the country's annual rainfall of 10 inches or so is pretty much concentrated between November and May in two or three heavy downpours and occasional small showers; in winter temperatures in the oil fields frequently drop below freezing. Fortunately, save for late July and early August when the hot south winds are blowing, the nights are relatively cool.

Desert Oil

Into this picturesque country has come

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INQUIRIES FOR PIPE REPORTED

The Iraq pipe line project, by which it is planned to transport large quantities of petroleum westward from the Mosul oil district to the Mediterranean Sea, has moved another step toward completion, with actual inquiry for 125,000 tons of steel pipe, according to advices in Chicago. Inquiries for pipe indicate the company is going ahead with its plans, which have been set for completion in 1935.

Already the company is said to have expended more than $20,000,000 in prospecting alone. It is expected that further field development work will accompany the work of laying the line. The pipe line will permit easy access of Mesopotamian crude to the refineries and markets of Europe, in competition with Soviet Russia, Rumania and, to some extent, the United States. It will eliminate a long water haul around southwestern Asia and through the Red Sea.

A recent dispatch from Bagdad says: The Iraq government is negotiating with Lord Wester Wemyss and Sir E. Mountain, directors of the British Oil Development Co. for oil concessions on the west bank of the Tigris. Concessions on the east bank already have been allotted to the Iraq Petroleum Co., which, by agreement, left the west bank open to exploitation by all comers. If a concession is granted to the British Oil Development, the company would most likely propose an agreement to share the Iraq Petroleum's pipe line when constructed.

Geological Features of Iraq Oil Field

Description of Famous Mesopotamian Area by Geologist of Near East Development Corp. Ideal Rock-Reservoir-Source

By Ben B. Cox
Geologist, Near East Development Corp.*

Iraq, formerly called Mesopotamia, in Asiatic Turkey, became a kingdom under British mandate after the World War and is expected to gain its independence in 1932 when it enters the League of Nations. It is slightly smaller than the State of Texas with its capital, Bagdad, inland about as far from the Persian Gulf as Breckenridge, Tex., is from the Houston Shipping Channel. The oil fields lie 180 to 225 miles north of Bagdad, or about as far as from Breckenridge to Oklahoma City, and about as far from the Mediterranean as Fort Worth is from Hobbs, N. Mex.

A narrow-gauge railway runs from Basra, the Persian Gulf port, to Bagdad. From there another narrow gauge runs into the Kurdish hills east of the Tigris to Kirkuk. A standard gauge, part of the old Berlin-Bagdad system, follows the west bank of the Tigris northward from Bagdad to Baiji, a village about 100 miles south of Mosul. No railway exists between Iraq and the Mediterranean, though the Anatolian Railways in southern Turkey come to within 50 miles of the Iraq frontier and 120 miles of Mosul. Surveys have been completed for a railway through British mandates from Haifa to Bagdad as well as for a railway through French mandated Syria from Tripoli to Abu Kemal near the Iraq border. Wagon roads, excepting those constructed by the oil companies, are few and indifferent in Iraq and no road exists across the desert to the Mediterranean, but contrary to prevalent beliefs, the surface is firm and free from sand dunes so that motor cars can go almost anywhere in dry weather with ease. Frequent motor car and airplane service exists between Bagdad and the Mediterranean ports and motor car service may be had between Kirkuk and Nisibin, Turkey, where on two days each week through Wagons Lits service is available to Paris. Bagdad is about 21 days distant from New York City with present transport facilities.

Country Described

The climate is semiarid, similar to Imperial Valley, California, the average rainfall outside the mountainous parts amounting generally to less than 10 inches per annum, concentrated in a few heavy rains and numerous showers between the months of November and early May. Winter temperatures in the oil fields commonly fall below freezing and maximum summer temperatures rise to 120 degrees or more in the shade. The nights are relatively cool in summer until late July and early August when hot south winds are blowing and a minimum diurnal temperature of about 105 degrees is commonly reached.

The country under present conditions supports a population of about 3,000,000 which is engaged in sheep herding, date raising, and general farming along the principal water courses. The native inhabitants are chiefly Arabs and Kurds with local admixtures of Persians, Turks, Tudomans, Assyrians, and Syrians. Excepting the irrigation farmers, the population outside the principal cities migrates with their herds with the seasons, spending the rainy winter months on the desert and moving up the stream valleys into the foothills and mountains in summer. Consequently, most of the land in Iraq is owned by the Iraq government. About 92.5 per cent of the population are Mohammedans, about 3.3 per cent are Jews, 3 per cent are Christians and the balance other religions.

Mountain peaks rise to 10,000 feet in the northeastern part of the country and extend as a system northwestward into Turkey and southeastward into Persia. West of the mountains lies a foothills belt 50 to 100 miles wide. This belt parallels the mountain system for the most part, swinging from an almost east-west alignment in northern Iraq to a northwest-southeast alignment southward, crossing the Iraq border into Persia near the Naft Khaneh oil field in the Transferred Territories and continuing in that general direction far south of the great Masjid-i-Sulaiman and Haft Kel fields in Persia. For the most part, the remainder of Iraq is an alluvial covered plain divisible into two parts: an eastern, or low Tigris-Euphrates plain, extending almost unbroken from the delta at the Persian Gulf northward to the foothills of northern Iraq and Syria and southern Turkey; and a western, or high, plain, of the Arabian shield which reaches a maximum elevation in Iraq of about 3,000 feet and averages between 1,500 and 2,000 feet.

Strata Exposed

A maximum of about 34,000 feet of strata ranging from Triassic to recent are exposed in Iraq. The greatest thickness probably occurs in the east-central part of the Mesopotamian geosyncline near or just east of the Jabal Hamrin-Nau Dumar foothills. The Iraq part of the Arabian shield, i.e., the area lying beyond 20 to 50 miles west of the Euphrates in Iraq, is thinly covered with

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*From The Lamp.

*Before A.I.M.E., New York, February, 1931. Published by permission of the Near East Development Corp.

Application of Herringbone Gears

Use in Transmitting Power From Motors or Engines to Oil Well Pumps, Pipe Line Pumps, and Other Pumps Described

By John Brandt and W. E. Sykes, Farrel-Birmingham Co., Inc., Buffalo, N. Y.
Presented before Mid-Continent Section, A.S.M.E., Tulsa, March 10.

The use of herringbone gears for transmitting power from motors or engines to oil well pumps, pipe line pumps and other pumps used in the oil industry is so general that it is unnecessary to deal with their fundamental advantages for this purpose. Their desirability and suitability is so widely recognized that there is seldom, if ever, any argument as to their superiority; but there is often a question raised as to the characteristics of herringbone gears to be adopted for a new installation; therefore, it seems worth while to ascertain what are the best proportions or sizes, the most desirable materials, the best method of lubrication, the design of housings, and maximum permissible speeds.

Brief History of Herringbone Gears

When herringbone gears were first developed during the eighteenth century, machine cut gears were unknown; all teeth were rough cast. The first herringbone gears—in fact, all gears with cast herringbone teeth, whether moulded from a full pattern or machine moulded—were made with continuous teeth, that is, teeth having the right and left handed helices joined at the center. Such gears are made at the present time. They are common in winch gears, especially those used on board ships. Sometimes they are made with shrouds at the ends of the teeth, the shrouds extending up to the pitch line, or a little below it, but more often they are made without shrouds. Nobody, so far as the writer can ascertain, has ever suggested that herringbone cast tooth gears should have a groove at the center of the face.

Development of machine-cut straight teeth resulted in straight tooth gears so much more accurate than machine moulded herringbone gears that the advantages of the herringbone principle, as applied to cast tooth gears, were offset by the greater accuracy obtained in the manufacture of machine-cut straight tooth gears.

With the development of higher speed machinery—which took place principally between the years 1890 and 1910—straight tooth machine-cut gears were found unsuitable, or at least they were not as satisfactory as desired. When De Laval and Sir Charles Parsons made their first turbines they were immediately faced with the problem of a suitable reduction gear. They each adopted double helical machine-cut teeth, and in order to cut such teeth with machines existing at that time they were compelled to provide a wide groove at the center of the face between the right and left-hand rows of teeth. This was not a desirable feature but was unavoidable, due to the limitations of gear cutting machines at that time.

As high speed machinery was developed, the demand for herringbone gears became more and more insistent with the result that much effort was exerted in developing suitable gear cutting machinery. In Europe, Citroen, in Paris, developed—between 1900 and 1904—the method of cutting continuous herringbone teeth with end-mills. This avoided the groove at the center but was a very slow and expensive process.

Commencing about 1902, Wuest, in Switzerland, developed hobbing machines which would cut herringbone teeth with a comparatively narrow groove at the center of the face. This resulted in the well-known "Wuest" type gears. The groove in all herringbone gears was, prior to the invention of the "Sykes" process, unavoidable and was much more objectionable than was realized. The narrowest groove which can be permitted by the Wuest method of cutting is equal to the circular pitch of the teeth.

It is significant that double helical gears are nearly always used for turbine drives, for heavy rolling mill work, and have been adopted for speed reduction units by the majority of gear manufacturers.

Tooth Deflections of Various Types

It has been stated that the continuous tooth herringbone gear is stronger at the center of the teeth than at the ends, and that as a result of this the ends of the teeth deflect more than the center of the teeth; and thus cause more load to be carried by the center of the teeth. Surely, this is as it should be. It is good engineering practice to carry the heaviest load on the strongest member or portion of a member. Let us deal, however, with this subject in a little more detail. Consider a straight tooth gear. Assuming that such a gear is mounted accurately, the load will be distributed along its face, but the ends of the teeth will deflect more than the center of the teeth; thus there will be more load at the center than at the ends. Consider a single helical gear in action; there will be contact at some phase of engagement at the end of any particular tooth, and at the same instant there will be contact farther along the adjacent teeth. Therefore, it may be argued that the teeth with a contact at the end will deflect more than the adjacent teeth having contact nearer the middle. Thus this type of gear has the same characteristics in this respect as the herringbone continuous tooth gear. Exactly the same arguments can be applied with equal truth to herringbone gears with a groove through the center of the face.

It is impossible to discuss thoroughly the nature of tooth contact without making elaborate diagrams and indulging in intricate technical details. Another paper dealing with the characteristics of the tooth contact of herringbone and helical gears and their load carrying capacity is in course of preparation. Without going into such details here it is perhaps desirable to state that contrary to the general conception, herringbone teeth do not have contact along their helical trace as it is commonly supposed. The contact between engaging teeth is along straight lines which are not parallel to the periphery of the gear but are placed at an angle to the periphery and take a position more or less diagonally across the tooth surface. These lines of contact can easily be seen on nearly all herringbone gears which have been cut by a planing or shaping generating process. If two of these gears be placed together and the lines of contact carefully observed, it will be seen that each tooth takes up the load on diagonal lines and that the theoretical minute deflections are of quite a different nature to that generally assumed.

In actual work the pressures on the teeth are so slight compared to the strength of the teeth that there is no injurious or objectionable deflection of the teeth either at the ends or at the middle. The tooth pressures are apparently too light to cause deflections of practical magnitude. Moreover, as already pointed out, these deflections, if of any practical consequence at all, are advantageous because they automatically throw the load to the portions of the teeth which are best able to carry it.

Diesel engine driven centrifugal pumps in the Sharpe, Kans., pump station of the Phillips Petroleum Co. showing herringbone gear speed increasers stepping up engine speed for pump drive.

Permissible Number of Teeth in Pinions

Such details as most desirable numbers of teeth in pinions, maximum ratios which can be usefully employed with a single gear pair, the proportion of pitch to face width, helical angle, pressure angle, are of more interest to the designing engineer than to the operating engineer to whom this paper is particularly addressed. It may be said, however, that herringbone gears can now be made with any number of teeth from one to infinity. However, it is not often, in practical work, that such small numbers of teeth are required. Close investigation has shown that in general a relatively large number of teeth in pinions—irrespective of the gear ratio—is desirable. For relatively low speeds, that is to say, velocities up to 1,000 f.p.m., pinions having from 12 to 20 teeth are frequently used, but the writer, in general, deprecates numbers of teeth less than 20 because he has found from an extensive analysis that more than 20 teeth in pinions are generally advisable. This statement implies that relatively fine pitches are advantageous.

Pressure Angles and Helical Angles

The standard pressure angle for herringbone gears is now 20°. This gives good practical results. There are two recognized standard helical angles; the old standard is 23° but the newer standard of 30° is rapidly making the smaller angle obsolete.

Face Widths

The helical angle influences the permissible narrowest face width in proportion to the pitch. With an angle of 30° the minimum face width in inches should not be less than 11 divided by the diametral pitch, but for the smoothest operation a still larger face width is advantageous.

Permissible Tooth Velocities

The question of permissible tooth velocities is largely a matter of care in manufacture and of the method of lubrication to be adopted. When herringbone gears run in a bath of lubricant the maximum velocity is usually assumed to be 2,800 f.p.m., although there are cases where gears lubricated in this manner are running at a velocity as high as 4,000 f.p.m. When the gears are lubricated by a spray of oil squirted onto the teeth by means of a pump, the peripheral velocity may be as high as 12,000 f.p.m. In some cases it has been proposed to operate herringbone gears at a speed of 18,000 f.p.m. and the writer believes that such a speed is permissible, but so far has no record of any gears operating higher than 12,000 f.p.m.

Strength of Herringbone Gears

The question is often asked, "How much stronger are herringbone teeth than straight teeth of the same size?" Painstaking investigation has shown that the strength of herringbone teeth, as far as resistance to breakage is concerned, is 40 per cent more than that of straight teeth, but so far as resistance to wear is concerned, the advantage is not so much in favor of herringbone gears but nevertheless it is quite appreciable and of great practical value, being 15 to 20 per cent. These figures, however, are obtained without taking into consideration the higher load carrying capacity of herringbone gears, due to smooth action and vibrationless operation. Taking this factor into consideration would necessitate also taking into consideration the matter of velocity and, consequently, the advantage of herringbone gears compared with straight tooth gears would vary in some proportion to the speed. Some investigators have stated that herringbone gears have more advantage as far as resistance to wear is concerned than as far as strength is concerned, but no general statement can properly be made on this subject.

Lubrication of Herringbone Gears

Lubrication, characteristics of materials and methods of mounting will be dealt with in reference to some typical examples of herringbone gears used on pumping machinery. In a pump in which the tooth velocity is approximately 1,000 f.p.m. a lubricant suitable for these gears has a viscosity of from 1,500 to 2,000 Saybolt at 100° F. The lubricant in the trough should be only sufficient to allow the gear wheel teeth to dip a little more than their depth; an excess quantity of lubricant creates a churning effect which generates heat and reduces the viscosity of the lubricant.

The herringbone pump line gear wheels are made in halves to permit it to be bolted to the crankshaft after the crank discs are put in place. Herringbone gears for well pumping rigs are now used almost universally. An idler gear is used in order to spread apart the distance between the high speed and low speed shafts, with the object of obtaining room for the hoisting sprocket wheels on the

(Continued on Page 84)

Danced By Light of First Kansas Gas

When John Werner, Seeking Oil, Struck Gas, no Way of Using It Appeared, so Enterprising Young Men Had a Bright Idea

By Thomas F. Smiley

It is not altogether easy to peer back through the haze of almost half a century and visualize the excitement created by the discovery of natural gas in Kansas. A generation to which gas and its multitude of uses are as commonplace as the kitchen sink must stretch its imagination to understand the astonishment, tinctured with something like awe, that swept the countryside when John J. Werner on July 25, 1882, struck gas at 305 feet on Abraham Westfall's farm, 1½ miles south and 1 mile east of Somerset, Miami County, and set it blazing from the top of a 20-foot vertical pipe. Few in the community ever had seen burning gas before. A meteorite crashing through the roof of Abe Westfall's barn scarcely could have aroused more commotion than this billowing flame which turned night into day.

Mr. Werner and eight other men, forming the Kansas Oil, Gas & Mining Co., had put down the well in the expectation of finding oil. Mr. Werner himself was a practical oil man, having worked in eastern fields. He served as driller of the Westfall well, with his father-in-law, Robert S. Cathers, also trained in oil fields of the East, as tool-dresser.

There seemed no way of immediately turning the discovery to account commercially, but two members of the company, H. J. Foote and Charles Kitchen, both of Olathe, Kans., hit upon a plan for capitalizing the wide interest in the well.

Dancing Platform Built

With the consent of the other members of the company the two men built a dancing platform in an elm grove near the well. Then at a height of about 8 feet they ran around the platform a small line from the vertical pipe mentioned. At close intervals along this line they installed flares, brightly illuminating the platform at night. At one edge of the platform they built a refreshment stand. Two young musicians of Paola, some 7 miles distant, one of whom played the violin and the other the violoncello, were engaged, and everything was ready for the Westfall gas well dances.

The platform was big enough to accommodate six sets in the old-fashioned square dances. The bass viol player called the figures. The enterprise was an instant success and the refreshment stand did a big business in lemonade, candy, sandwiches and cigars. The attendance some nights was estimated at 500. Those who did not dance watched the others and admired the fairy-touched spectacle. All patronized the refreshment stand, where four attendants were kept busy. No charge was made for dancing, the profits, all of which went to the two promoters, coming from the refreshment stand.

There was no rowdyism, but the spirit of fun ran high. Each evening as darkness fell the two-piece orchestra tuned up, laughing couples took their places on the floor and the violoncellist intoned: "Salute your partners!" "Right and left!" "Balance and turn!" "Ladies' chain!" "Half promenade!" "Half right and left!" And the dance was on. Occasional schottisches, polkas and waltzes were intermixed with the square dances.

Romance Tinged the Scene

Romance tinged the nightly scene. Young couples, usually wearing their Sunday best, drove to the well in buggies, buckboards or other horse-drawn conveyances. After going through the rythmic measures of a dance they sometimes would slip away from the brightly lighted platform and stroll off into the friendly shadows of the elm trees.

"It was nice, clean entertainment and everybody enjoyed it," writes Mr. Werner, who at the age of 81 resides in El Monte, Calif.

"I was about 10 years old," said A. E. Whitaker, who still resides on a farm near the old well. "I remember how one night while I was watching the dancers, rather overawed by it all and bashful like any boy of that age, a woman old enough to be my mother grabbed me and laughingly took me out on the floor. I went through the figures as well as I could."

Isaac Wise, still a resident of the neighborhood, lived on a farm near the Westfall property and was 24 years old when the well was drilled. He recalls how the region was thrilled by the news that gas had been struck and how throngs gathered at the dancing platform night after night.

The young gas company had to pass through tribulation and undergo changes in its personnel before it achieved anything that remotely resembled success, and it was years before the natural gas business in Kansas, starting with the discovery well on the Westfall farm, grew into an important industry. The Kansas Oil, Gas & Mining Co. drilled two more wells on the Westfall farm, neither of which produced oil or gas in commercial volume.

They Tell This on Abe

One of the lighter incidents in connection with the No. 2 Westfall recalled by those who lived in the neighborhood had to do with Abe Westfall and a fat hog which escaped from its pen near where the well was being drilled. It was a hot day, and after running for a little while with Abe in perspiring pursuit the hog dropped dead at the edge of a cornfield, out of sight of the men at work on the well but within hearing distance. Abe was loath to lose several hundred pounds of pork, but he knew that few persons would relish the meat if it were known that it came from an animal that had "died of heart disease," so he decided upon a ruse.

Going to the house, Abe got a butcher-knife. Returning then to the carcass of the hog he stuck it in the usual way, at the same time imitating the squeals of a pig to allay possible suspicions on the part of the men around the well as to how the hog met its demise. But the trick was discovered with the result that for a long time afterward wherever Abe appeared some rustic wag was likely to greet him with a bantering "We-e-e-e-e! Oink, oink!"

What is believed to have been the first instance of "salting" a well in Kansas, and probably in the Mid-Continent territory, is recorded in connection with the No. 1 Westfall. As already mentioned, it was hoped to strike oil, for this particular location had been chosen owing to certain surface indications. There was only one drilling "tower," Mr. Werner and his father-in-law, Mr. Cathers, doing all their work in the daytime. From the time that construction of the derrick began curious country folk watched operations.

Getting an Oil Showing

One night somebody, under cover of the darkness, poured several quarts of crude oil down the well hole. Of course there was an excellent "oil showing" the next day. The news spread fast, but Mr. Werner's suspicions were stirred. These suspicions were confirmed soon afterward when he was approached by a member of the company who confided to him how the oil had got into the well and pointed out that it would be easy to sell the well as it stood to unsuspecting persons at a big price. Mr. Werner readily conceded that the well might be sold at a handsome profit, but he refused to have anything to do with the swindle. The man who had salted the well withdrew from the company shortly afterward and he is said to have become well-to-do through operations in which he was able to give his talents freer play.

A workman lighting his pipe caused the first gas well fire in Kansas at the No. 1 Westfall. It caused plenty of excitement and called on the ingenuity of Mr. Werner and Mr. Cathers to subdue it.

When the casing had been set the collar on the top joint projected a few inches above the floor of the derrick. No regular casinghead being available, a bullplug was screwed into the collar. This capping device was leaky, however, so the drill stem, instead of being taken out of the derrick, was let down so that its weight rested on the bullplug to prevent it from being blown off. John Arney, who did hauling for the gas company, struck a match to light his pipe one morning while standing on the derrick floor. There was a burst of flame and an explosion which knocked the man off his feet. Except for fright and singed hair he was not hurt, but the leaking gas which had been ignited caused a menacing fire.

Showed the Crowd How to Do It

Both Mr. Werner and Mr. Cathers had gone to Paola that morning. When they returned in the afternoon they found a crowd gathered around the well. Futile efforts had been made to smother the fire with bed quilts and blankets. The two men devised a method of procedure. First they raised the tools off the improvised casinghead, whereupon the bullplug was blown off the collar, which had expanded as a result of the heat. Working swiftly, they screwed two joints of casing together and with a sandline drew them up into the derrick. A piece of small pipe fastened so that it extended from the inside of the lower joint served as a guide, and when the two joints were let down carefully this piece of small pipe entered the well casing, thus bringing the two joints suspended from the sandline directly over and resting on the casing-collar at the floor.

The result was what Mr. Werner and his father-in-law had expected. The burning gas shot up through the two casing joints and the flame issued from the top, 40 feet up in the derrick. The men then fastened two pairs of tongs on the suspended casing and with a quick movement lifted it off the collar, thus breaking the flow of gas through the two joints of pipe. With the gas supply thus cut off the flame at the top went out, and the state's first gas well fire had been conquered. Cheers from the crowd of watchers greeted the feat. The well then was capped so that there was no leaking gas to cause further trouble.

Could Draw Crowd 10 Years Later

The marvels of natural gas were still fresh, mysterious and dazzling in Kansas communities for more than a decade after John Werner drilled the discovery well on Abe Westfall's farm. As evidence of this is the following news item printed in the South Kansas Tribune, of Independence, July 12, 1893, under the headlines, "Natural Gas; Fine Display, Big Crowds":

"As is well known, the Independence Gas Co. has been drilling on the farm of J. H. Brewster, east of the city 4 miles, and on adjoining farms, and have found natural gas, but our citizens had no practical demonstration of the volume. To convince all Mr. Brewster invited the public to witness an illumination on Tuesday night and we are happy to state that it was so generally accepted by hundreds of our people that there was not another team to be obtained. Imagine the great surprise when we came in sight of the Brewster farm to see it illuminated practically for half a mile along the roadway with nature's own fireworks. The display was simply immense and exceeded in volume and brilliancy all expectations. Through the timber pasture and about the residence, barnyard and in the road in front were a number of seething, roaring lights, 20 feet high and of sufficient brilliancy that one could read.

"There were derricks entwined with the national colors, and the sign of the gas company stretched between: 'Inde-

(Continued on Page 84)

WHY LAUGH? IT WORKED, DIDN'T IT?

The hubbub stirred by John Werner's discovery gas well in Kansas recalls the marvelous natural gas pipe line built by Daniel Foster, Findlay, Ohio, farmer, back in 1838 and the gaping wonder it aroused. Foster was digging a water well when gas began issuing from the hole. Being of an inventive turn of mind, he inverted a copper kettle over the hole and then rigged a wooden pump stock beneath the uptilted kettle, making a gas-tight joint with clay as plastering material. The kettle was his casinghead, and the pump stock was the first joint of pipe in his gas line. More pump stocks carried the line to his dwelling nearby, clay being used in lieu of collars to connect the joints. An old gun barrel fastened in the end of the last pump stock carried the gas into the kitchen. Here it was lighted, and by means of the flame the family was able to boil water, roast coffee and illuminate the kitchen. How long this amazing natural gas system was used is not recorded.

Dr. Charles Oesterlin, a young German physician practicing in Findlay, declared his belief that by drilling into the ground gas enough to provide the city with fuel and illuminant could be found. Folk scoffed at the idea. Forty-six years passed before the physician, now white-haired and infirm, was able to raise $4,000 to test his theory by drilling. A well that produced 250,000 feet of gas daily vindicated him.

Big Meeting Is Planned By Geologists

Wide Variety of Subjects on Program of Annual Meeting of A. A. P. G. at Oklahoma City Next Week

The seventeenth annual meeting of The American Association of Petroleum Geologists will be held at Oklahoma City, Okla., March 24, 25 and 26. The new Biltmore Hotel is convention headquarters. Local arrangements for entertainment are being made by the Oklahoma City Geological Society, affiliated with the national organization. Concurrent meetings will be held by the Society of Economic Paleontologists and Mineralogists and by the Society of Petroleum Geophysicists.

The officers of the association, which has an international membership of 2,550, are: President, L. P. Garrett, vice president, Gulf Production Co., Houston, Tex.; past president, Sidney Powers, consulting geologist, Amerada Petroleum Corp., Tulsa, Okla.; first vice president, L. C. Decius, chief geologist, Associated Oil Co., San Francisco, Calif.; second vice president, Frank R. Clark, chief geologist, Mid-Kansas Oil & Gas Co., Tulsa, Okla.; third vice president, F. H. Lahee, chief geologist, Sun Oil Co., Dallas, Tex.

The Oklahoma City Geological Society general committee on arrangements is composed of the following: Irving Perrine, chairman; A. H. Richards, business manager; W. H. Atkinson, president, and G. C. Maddox, R. M. Whiteside and J. T. Richards. Group chairmen are: Technical, G. C. Maddox; reception, W. L. Miller; entertainment, Roy Dale Jones; trips, W. W. Clawson; finance, R. W. Laughlin; publication, A. H. Richards; registration, J. T. Richards; ladies, W. H. Atkinson; publicity, Albert S. Clinkscales; exhibits, H. S. Thomas; golf, F. M. Ricks.

F. H. Lahee, Box 2880, Dallas, Tex., has charge of the technical program. Hotel reservations and inquiries about local arrangements should be addressed to the local committee headquarters, 2600 Ramsey Tower, Oklahoma City.

The tentative schedule of events follows.

Wednesday, March 23

Registration. Committee meetings: Executive, research, constitution and bylaws, geologic names, business. Biltmore Hotel.

Thursday, March 24

Registration. Technical sessions. Nomination of officers. Biltmore Hotel. College and fraternity meetings. Ladies' entertainment.

Friday, March 25

Balloting for officers. Technical sessions. Biltmore Hotel. College and fraternity meetings. Field trips. Ladies' entertainment. Dance.

Saturday, March 26

Business meeting. Election of officers. Executive committees. Technical sessions. Biltmore Hotel. Field trips. Ladies' entertainment.

The following list of technical papers is scheduled for presentation at the meeting.

Group 1. Mid-Continent and Gulf Coast

1. Structural History of Seminole Uplift, Oklahoma, by Ira H. Cram.
2. Geology and Development of Oklahoma City Field, Oklahoma County, Oklahoma, by W. W. Clawson and D. A. McGee.
3. Tectonics of Oklahoma City Structure, by L. L. Foley.
4. Base Replacement Studies on Oklahoma Shales—A Critique of the Taylor Hypothesis, by L. C. Case.
5. Geology and Occurrences of Natural Gas in Amarillo District, by Victor Cotner and H. E. Crum.
6. Shallow Salt-Type Structure in Permian of North Central Texas, by Urban B. Hughes.
7. The Concho Divide, by M. G. Cheney and Sidney L. Harris.
8. Stratigraphic and Structural Relations of Pre-Carboniferous Formations in Big Lake Field, Reagan County, Texas, by E. H. Sellards.
9. Regional Structure of Cretaceous in Edwards Plateau, Texas, by Lon D. Cartwright, Jr.
10. Natural Gas in West Texas and Southeast New Mexico, by R. E. Rettger, J. Ben Carsey and J. E. Morero.
11. The Ouachita Epeiroplain, by J. W. Beede.
12. Paleozoic Folding in Trans-Pecos Texas, by Philip B. King.
13. Geology of East Texas Field, by H. E. Minor and Marcus A. Hanna.

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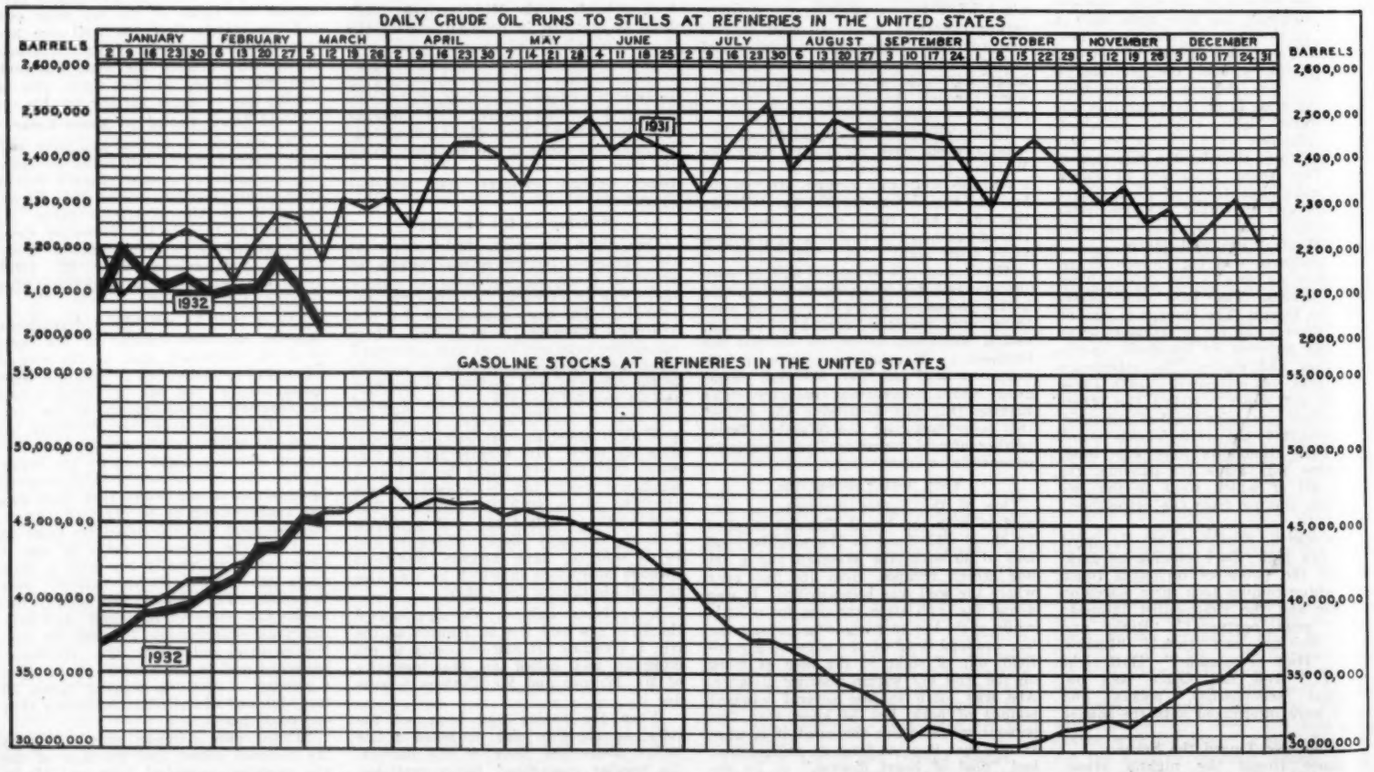
AMERICAN PETROLEUM INSTITUTE WEEKLY REFINERY STATISTICS

The weekly report made to the American Petroleum Institute on refinery statistics—crude runs to still, gasoline stocks and gas and fuel oil stocks in barrels—for the week ending March 12.

	Week ending March 12				Week ending March 5, 1932				Week ending March 7, 1931			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
East Coast	100.0	426,100	6,708,000	6,293,000	100.0	422,300	6,619,000	6,500,000	100.0	453,500	8,180,000	7,085,000
Appalachian	91.8	89,900	1,810,000	1,149,000	91.8	87,300	1,772,000	1,131,000	93.8	92,700	1,512,000	1,052,000
Indiana, Illinois, Kentucky	98.9	269,600	5,587,000	4,234,000	98.9	257,600	5,759,000	4,669,000	97.5	270,500	6,169,000	3,057,000
Oklahoma, Kansas, Missouri	89.6	217,300	3,774,000	3,091,000	89.6	192,700	3,793,000	3,201,000	89.4	221,000	3,236,000	3,777,000
Texas	91.3	473,700	8,913,000	9,569,000	91.3	414,600	8,978,000	9,895,000	91.9	544,800	7,920,000	8,319,000
Louisiana and Arkansas	98.9	143,700	1,688,000	3,931,000	98.9	144,700	1,632,000	4,011,000	98.3	139,700	1,907,000	2,363,000
Rocky Mountain	89.4	30,700	1,965,000	671,000	94.0	29,350	1,966,000	676,000	93.1	37,500	1,840,000	851,000
California	97.1	413,700	14,916,000	96,045,000	97.1	419,500	14,910,000	96,042,000	98.5	413,100	16,025,000	100,924,000
Total United States	95.2	2,063,700	45,661,000	125,023,000	95.2	1,968,300	45,429,000	126,175,000	95.7	2,172,100	45,789,000	127,428,000
Texas Gulf Coast	99.8	586,600	7,134,000	6,849,000	99.8	533,680	7,179,000	7,191,000	100.0	438,600	6,670,000	5,980,000
Louisiana Gulf Coast	100.0	95,700	1,551,000	3,302,000	100.0	89,000	1,498,000	3,327,000	100.0	94,400	1,684,000	1,308,000

(1) Per cent refinery capacity represented. (2) Daily crude runs to stills. (3) Gasoline stocks. (4) gas and fuel oil stocks.



All data based on weekly reports of the American Petroleum Institute. Figures for last week not shown in graph but are included in above table.

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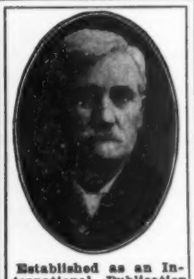

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Method for Determining Vapor Lock

Simple Apparatus Is Described and Directions for Application Given. Used for Finding Gasification Tendency

By C. K. Francis, Ph.D.
Technical Editor

Vapor lock, or as it is frequently called, gas lock, is a condition involving partial or complete stoppage of the flow of gasoline in the fuel feed system of an internal combustion engine, such as is used for automobiles and aircraft, because of the formation of a relatively large volume of gas. This gas operates to shut off the supply of liquid due to the fact that it occupies the space that otherwise would be filled with the fuel. It has been explained that vapor lock is the result of a preheating of the gasoline, before delivery to the cylinders, to a temperature approximating the 10 per cent point as determined by the A.S.T.M. distillation method, including the correction for loss.

The evidence of a vapor lock condition may appear to the motorist in four forms. 1. Failure of the engine to idle after running at high speed when the atmospheric temperature is high or in traffic. 2. Uneven running of the engine during acceleration. 3. Intermittent operation, or jumping, at high speed. 4. Complete stopping of the engine.

Engine Heat

The boiling of the gasoline within the fuel feed system must depend upon the heat from the engine, excepting the rare instances of abnormal atmospheric temperatures, so that the position of the fuel system with respect to the engine walls and the design of the system itself are factors that have much to do with the preheating of the fuel. Bridgeman explains these: "In gravity feed systems, vapor lock usually occurs between the tank and the carburetor. In vacuum tank systems, it usually takes place between the vacuum tank outlet and the carburetor. In fuel pump systems, the flow is interrupted on the suction side of the pump. In rare cases, vapor lock will occur in the carburetor jets." The same authority reports that measurements of the temperautre of the gasoline in 27 automobiles showed that the temperature of the fuel in the carburetor was 41° F. above that of the atmosphere.

The 10 per cent point of the distillation test, as an indication of the temperature at which vapor locking may be expected, and the pressure found by the Reid vapor pressure test, furnish information for eliminating many gasolines of high vapor lock tendencies. If the 10 per cent point is not much below 150° F. and the vapor pressure between 6.5 and 12 pounds, which are the requirements of commercial specifications, it is generally thought that vapor lock could be eliminated.

Gas Volume

While investigating a commercial gasoline, reported to be the source of serious vapor locking, which apparently met the recognized specifications, it was thought that a determination of the volume of gas evolved from a definite quantity of the gasoline when heated to slightly elevated temperatures, would be of value.

The apparatus devised for collecting the gas at any desired temperature is shown in the accompanying figure. A large glass cylinder fitted with rubber stoppers serves as a water jacket for controlling the temperature. The top stopper holds an inverted 50 c.c. burette, a thermometer, and a water outlet tube. The lower stopper holds, besides a water inlet tube, a glass tube slightly offset near the upper end and with a small opening. The sample bottle consists of a 4-ounce bottle fitted with a rubber stopper holding two glass tubes. The tube connected to the bottom of the water jacket extends to nearly the bottom of the bottle. The other tube is fitted with an aspirator bulb and projects only slightly beyond the stopper. The water reservoir, not shown, is a container of about 5 gallons capacity fitted with a steam-coil for heating, and is placed at a convenient elevation to furnish adequate circulation.

When making a determination, the sample is placed in the 4-ounce bottle, which is surrounded by cracked ice. The jacket is filled with water cooled to below 40° F. Then the water level in the burette is allowed to rise to the top graduation by venting air through the tube connected to the top of the burette. The glass tube on the sample line is turned so that its opening is away from the burette. Gasoline is forced from the bottle through the tube and allowed to rise through the water in the jacket, then through the water outlet at the top. This purges the line.

Determination

A sample is introduced into the burette. This is accomplished by turning the glass tube of the sample line until its opening is directly under the burette. A small quantity of gasoline is forced from the bottle into the burette, where it rises through the water to the top graduation mark. Here the sample is measured. The size of the sample depends upon the volatility of the gasoline under test; 3/10 to 5/10 c.c. for very volatile fuels, and ½ to ¾ c.c. for others.

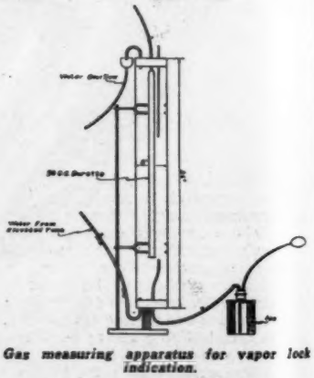
Water at 110° F. is passed into the jacket through the inlet at the bottom, and the overflow is carried off at the top. When the thermometer reading has become constant at 110° F., and the gasoline level in the burette has remained constant for three minutes, the volume of gas as at the top meniscus of the gasoline is recorded. This operation is repeated for water jacket temperatures of 112°, 114°, 120°, 125° and 130°.

After recording the gas volume at 130°, the water temperature is raised to about 135°, and the burette is emptied by opening the vent tube connected to its top and blowing the residue out through the bottom so that it passes out with the water overflow. Water below 40° is passed into the jacket, and the apparatus is prepared for the next sample.

Numerous samples of different gasolines were examined by this method and data shown in the table, representing 10 different fuels, indicate the general tendency found. The gas volume was that found at 125° F.

Road Test

The gasolines represented by 4, 7 and 8 in the table were tested in a Buick car driven over paved roads with the atmospheric temperature at about 70° F. In each test these samples produced a serious vapor lock within one hour when the speed ranged between 40 and 60 miles per hour. Sample No. 9 represents a natural gasoline which, although not used in the car, would unquestionably have formed enough gas to cause vapor locking. Road tests were not made with No. 5. Car tests with the other gasolines produced negative results.



Gas measuring apparatus for vapor lock indication.

The figures reported under gas volume have been calculated from the quantity found. The number of cc./minute is estimated from the normal consumption of 3 gallons per hour when averaging 45 miles per hour. This figure when considered for samples 4, 7 and 8, is of particular interest. Each of these tested within the specification for Reid vapor pressure but appeared to be somewhat too volatile, with the 10 per cent point within the objectionable range. Gasoline No. 4 was not a commercial fuel but represented a cracked blending stock, the other two were gasolines as found on the market. When remembering that 4,841 and 4,920 cc. mean volume over 1.3 gallons it is apparent that the volume of gas evolved per minute is certainly excessive for the fuel feed system of the automobile as now designed.

An effort was made to correlate the gas volumes as determined by the method described with Reid vapor pressure determinations, but no fixed relation was found for the gasolines examined.

The simplicity of the apparatus and method, together with the rapidity with which a test may be completed, provides a convenient means for examing gasoline with respect to its tendency to form gas at relatively low temperatures.

VOLATILITY AND GAS EVOLVED

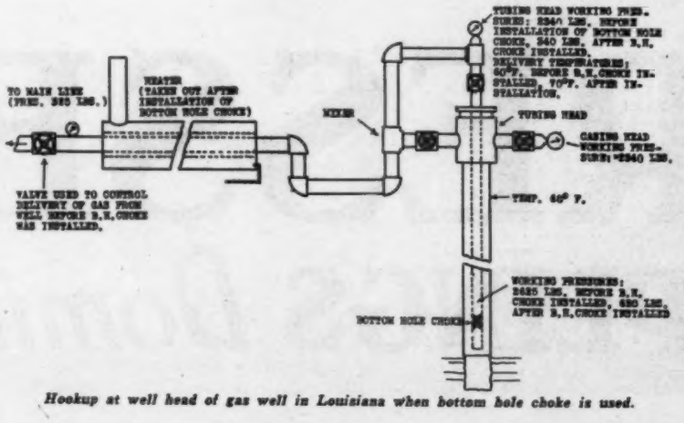
Sample	Gravity A.P.I.	Gravity °F.	I.B.P.	Per cent off 10	Per cent off 50	Per cent off 90	E.P.	Re-covery	Octane No.	R.V.P.	Gas. vol. @ 125° F. cc./gal.	Gas. vol. @ 125° F. cc./min.
1	57.2	106	156	264	388	437	97	68	6		21,196	1,059
2	59.4	94	156	272	378	408	96	74	7		25,738	1,286
3	60.9	104	156	350	352	402	97	55	5		8,024	401
4	60.0	88	130	180	225	245	95	78	9		137,774	6,872
5	64.0	84	146	236	301	330	97	70	..		66,616	3,330
6	60.1	93	161	272	365	398	96	50	6		22,710	1,135
7	60.6	80	122	244	388	414	96	74	8		96,896	4,841
8	60.4	77	116	240	380	410	96	76	9		98,410	4,920
9	82.5	60	82	142	285	353	92	..	10		397,425	19,871
10	65.2	98	130	216	272	364	94	62	9		22,710	1,135

USE OF BOTTOM HOLE CHOKES AID GAS WELL PRODUCTION

Handling small daily withdrawals from large volume high-pressure gas wells is ordinarily both a difficult and dangerous operation because of the accompanying low temperatures and freezing of controls. Several types of heaters have been designed to overcome this difficulty. The heaters are usually located at some distance from the well. Since full well working pressure is usually carried to a point just beyond the heater, surface fittings must be kept under high pressure. Variation in rate of withdrawal from the well, in the line pressure to the heater flame, in surface temperatures, etc., all vary the heater requirements. Under extreme conditions failure for only a few minutes to adequately heat the gas before reducing its pressure results in the controls freezing and consequently in interrupting the supply of gas to the pipe line, and in subjecting the surface fittings through the heater to the point of pressure regulation to the full closed pressure of the well. In addition, extremely low temperatures on these fittings may subject them to strains equal to or greater than those set up by the high pressures alone.

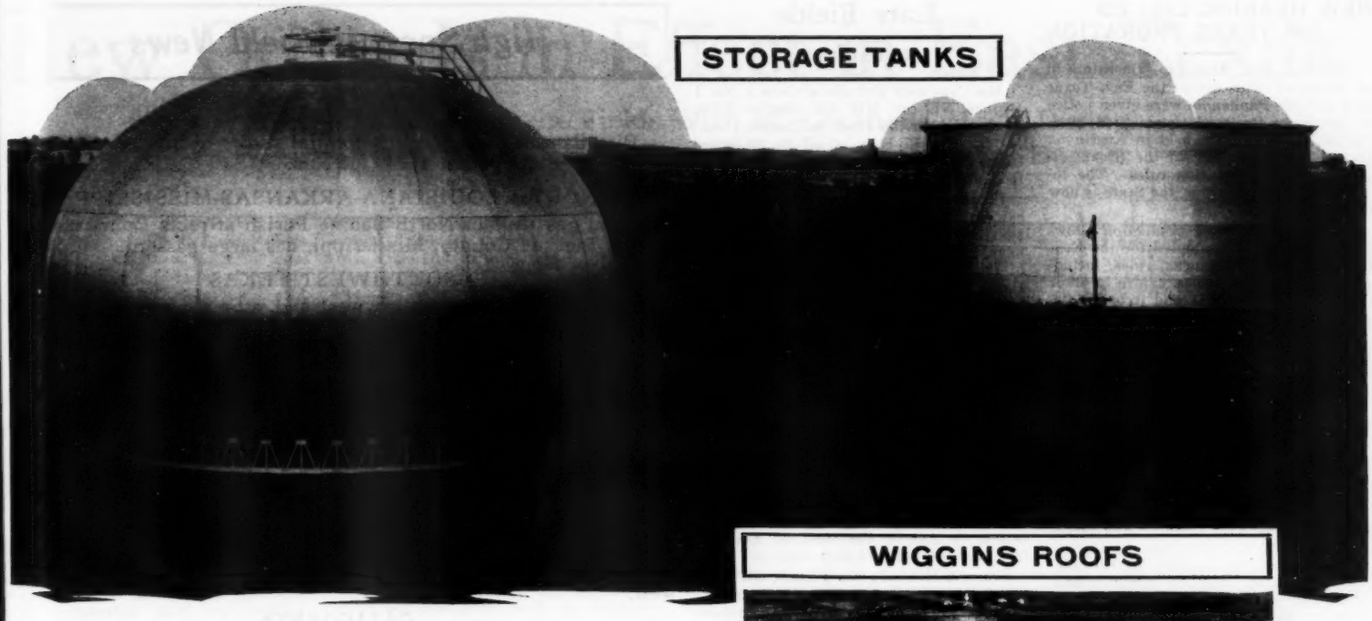
Gas wells producing from the Trinity zone in the Rodessa, La., Field are approximately 5,600 feet deep, have a closed-in surface pressure of 2,340 pounds, open flow volumes, and a high gasoline content. Although all of these wells except the discovery well are equipped with 2-inch tubing, a daily withdrawal of at least 2,500,000 feet each has been found necessary to continuously raise the gasoline from the bottom in such a way as not to interfere with accurate metering. A double installation of the most approved type of heaters was made at each well before attempting to put them on the line, but in spite of this careful preparation, it was found difficult to satisfactorily feed the lines at low rates of delivery. From 3 to 10 hours were required in placing a well on the line and in adjusting the heater. During this time it was necessary to keep several men at the well, and even after all was regulated as satisfactorily as possible, a watchman was kept at the well

(Continued on Page 85)

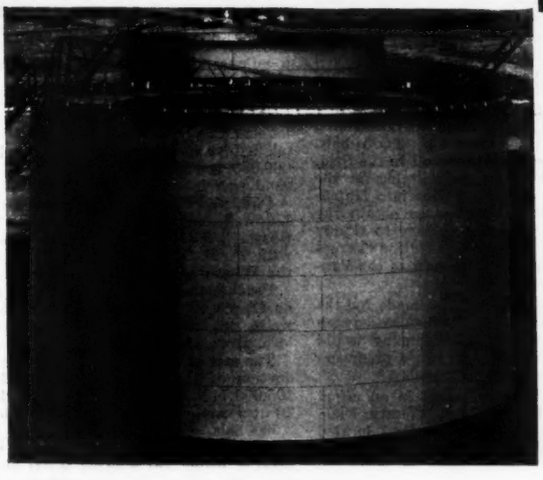

TO MAIN LINE (PRES. 985 LBS.)
HEATER (TAKEN OUT AFTER INSTALLATION OF BOTTOM HOLE CHOKE)
VALVE USED TO CONTROL DELIVERY OF GAS FROM WELL BEFORE B.H. CHOKE WAS INSTALLED.
MIXER
TUBING HEAD WORKING PRESSURE: 2340 LBS. BEFORE INSTALLATION OF BOTTOM HOLE CHOKE, 840 LBS. AFTER B.H. CHOKE INSTALLED. DELIVERY TEMPERATURE: 60°F. BEFORE B.H. CHOKE INSTALLED, 70°F. AFTER INSTALLATION.
TUBING HEAD
CASING HEAD WORKING PRESSURE 2340 LBS.
TEMP. 60° F.
WORKING PRESSURES: 2625 LBS. BEFORE B.H. CHOKE INSTALLED, 680 LBS. AFTER B.H. CHOKE INSTALLED
BOTTOM HOLE CHOKE

Hookup at well head of gas well in Louisiana when bottom hole choke is used.

STORAGE TANKS



WIGGINS ROOFS



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HOUSTON ---------- 1119 Electric Bldg.
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BIRMINGHAM ---------- 1536 Fiftieth St., N.
CHICAGO ---------- 2128 Old Colony Bldg.
DETROIT ---------- 1514 Lafayette Bldg.
CLEVELAND ---------- 2204 Midland Bldg.
NEW YORK----3147 Hudson Terminal Bldg.
PHILADELPHIA 2615-1616 Walnut St. Bldg.
BOSTON---------1517 Consolidated Gas Bldg.
SAN FRANCISCO---------1054 Rialto Bldg.
SEATTLE ---------- 4323 Smith Tower
LOS ANGELES---1323 Pacific Mutual Bldg.
HAVANA, CUBA ---------- Apartado 2507

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NEW HEARING CALLED ON TEXAS PRORATION

AUSTIN, Tex., Mar. 14.—Operators in all Texas oil fields except the East Texas area and the Panhandle were given notice by the State Railroad Commission Monday of hearings to be held in Austin on March 30 preparatory to the promulgation of new conservation rules. The total prorated allowance of the State is now 755,700 bbls.

New rules, including production allowables, were recently adopted for the East Texas Field. Conservation rules, including production allowables, expire in other Texas fields on April 1 and it is for the purpose of obtaining data on which to base new ones that the March 30 hearings were called. The regulations expiring April 1 will remain in force, however, until they are replaced by new orders.

The commission after a hearing Monday took under consideration an application of the Shamrock Oil & Gas Co. to detach the Moore County Field from the Panhandle oil district. The request was based on a claim that the Moore County Pool is not connected with the field in Gray and Hutchinson Counties and therefore entitled to be treated as the statute directs all pools of less than 10,000 bbls. daily production shall be administered. No request was made for changing the 55,000-bbl. limit in the Panhandle.

John J. Sheerin, president of the company, said the Moore County wells now were producing only 600 or 700 bbls. daily under the state allowable and that his company had in mind operation of a refinery to consume about 3,000 bbls. daily if it could obtain the oil in the field. He said it would be unprofitable for the company to build a pipe line into Hutchinson and Gray Counties to obtain the additional petroleum necessary to supply the plant or to pay transportation charges on the oil from the other part of the Panhandle Field.

If arrangements could be made for the Moore County Field to furnish enough oil for the refinery, his company would purchase it ratably from other producers in the field as well, he stated.

Geologists were presented in an effort to show that the Moore County Field was not a part of the Borger Pool, located 50 miles southeast from the Shamrock holdings.

TO DESCRIBE KETTLEMAN HILLS

A special joint meeting of the Mid-Continent Section of the A.I.M.E. and the Tulsa Geological Society is called for 8 p.m., March 21, in the assembly room on the fourth floor of the Tulsa Building, Tulsa, to hear a discussion on various phases of the operation of the North Dome of Kettleman Hills, California, by R. C. Patterson, district engineer for the U. S. Geological Survey.

Mr. Patterson is returning to California from a recent trip to Washington where as chief engineer in charge of oil and gas operations in the Kettleman Hills district, he made complete report to the Geological Survey covering conservation of gas energy, geology, engineering problems, control of drilling and unit operation. It is understood these subjects will be covered in the discussion in Tulsa.

MAGNETIC STORM

The U. S. Coast and Geodetic Survey Magnetic Observatory at Tucson, Ariz., reports a moderate magnetic storm starting at 6 a. m. (C.S.T.) March 9 and ending at 8 a. m., March 10. Its telegram follows:

"Storm began ninth. Twelve. Moderate. Ended tenth. Fourteen."

PIPE LINE CONTRACT LET

Williams Brothers, of Tulsa, have been awarded the contract for 18 miles of 10-inch gas line and approximately 10,000 feet of 8-inch river pipe for the Panhandle Eastern Co.'s line from Hannibal, Mo., to Quincy, Ill.

Late Fields

OKLAHOMA

Mid-Continent Petroleum Corp.'s No. 1 Bruner, NE cor. NW SE, Section 9-7-8, in the Holdenville Pool, in Hughes County, flowed 575 bbls. of oil in 24 hours from the Wapanucka sand at 2,934-54 feet, and was shut in for tankage.

In the area south and west of Duncan, in Stephens County, three tests were nearing completion which are expected to have an important bearing on the future of the field. Continental Oil Co.'s No. 2 Dare, NW cor. SW SE, Section 2-2s-8w, on the southwest edge of the field has landed casing at 2,093 feet on top of the sand. The well is at a total depth of 2,122 feet. Curtis Oil Co.'s No. 2 Dare, NW cor. NE SE, Section 2-2s-8w, has cemented casing at 1,376 feet, total depth 1,381 feet, in sand. It was showing oil and will be drilled in and tested in a few days.

P. L. Gilbert's No. 2 Green, SW cor. SE, Section 2-2s-8w, is a new location. G. L. Pace's No. 2 Green, SE cor. SE SW NE, Section 2-2s-8w, has landed casing on top of the sand at 1,390-96 feet to make a production test.

Crane & Rankin's No. 1 Dare, SW cor. SW NW, Section 1-2s-8w, is a location. E. Chamberlain's No. 1 C. P. Parker, NE cor. NE SE SE, Section 11-2s-8w, a mile south of activity in the field, is waiting for tools.

Anderson & Kerr's No. 1 Volk, C N half NW NW SE, Section 15-11-3w, Oklahoma City Field, flowed 8,510 bbls. of oil in four hours, with an estimated 91,000,000 feet of gas a day. The Wilcox sand was found at 6,402-6,560 feet.

Phillips Petroleum Co. and others' No. 1 Cowell, SW cor. NE, Section 22-11-3w, flowed 2,782 bbls. of oil in four hours with 18,000,000 feet of gas a day from the Wilcox sand at 6,490-6,567 feet.

Production of the Oklahoma City Field on March 12, was 38,905 bbls. from 103 wells, production March 13, was 57,149 bbls. from 113 other wells.

The new order fixing the allowable production of the Oklahoma City Field at 105,000 bbls. a day was effective March 16 at 7 a.m. The time zone was allotted 3,500 bbls. a day or 500 bbls. less than in the last previous period. The 91 wells making water are allotted 9,100 bbls. a day. The 675 wells even with proration and outside of the lime zone, are allowed to produce 25 bbls. each or a total of 16,875 bbls. a day. Production from new wells is estimated at 3,000 bbls. a day. A total of 43,450 bbls. will be allotted to deferred underage, with the remainder or 12,890 bbls. allotted to current underage. Wells even with proration are allowed one-half of 1 per cent of their current potential.

KANSAS

Tom Palmer and others' No. 1 Pasek, C SE, Section 3-14-11w, a wildcat in Russell County, found a showing of oil at 3,397-3,437 feet, in Silicious lime. The 6-inch casing was landed at 3,320 feet and it is being underreamed to the top of the Silicious lime preparatory to testing the oil showing. The Deep Rock Oil Corp. has recently acquired an interest in the test.

Skelly Oil Co.'s No. 1 Leisman, C SE SW, Section 20-27-10w, Kingman County, is a rig building. It is a wildcat test located several miles from the nearest production.

McMurray and others' No. 1 Hardesty, C SW SE, Section 27-27-11w, Pratt County, is rigging up. It is the only test in the county and is a wildcat.

The Texas Company and others' No. 1 Stratman, NW cor. NE NE, Section 12-17-10w, is a location. It is the seventh test in the Stratman Pool, in Ellsworth County.

O. K. SHANNON RESIGNS

FORT WORTH, Tex., Mar. 14.—O. K. Shannon, vice president and a member of the board of directors of the Lone Star Gas Co., in charge of operations in the Fort Worth district, has resigned from this position, effective March 1. Mr. Shannon became vice president of the Lone Star Gas Co. a year ago when the name of the Fort Worth Gas Co. was changed to the Lone Star Gas Co. He had been connected with the gas company at Fort Worth for 24 years. Prior to that he was secretary of state.

WILCOX REFINERY FIRE

FORT WORTH, Tex., Mar. 15.—Six men were seriously injured when the H. F. Wilcox Oil & Gas Co.'s refinery at Pampa, Tex., was destroyed by explosions and fire Saturday, March 12.

The men who were injured are R. H. Bell, L. C. Lafferty, Jay Warren, W. L. Owens, John Oakes, superintendent of the plant, and "Slick" Huskins. The refinery had a capacity of 4,000 bbls. of crude daily.

COMPLETE RUMANIAN UNIT

NEW YORK, Mar. 8.—A. F. Craig & Co., Ltd., British representative of the Winkler-Koch Engineering Co., have completed the fabrication and erection of a 6,000-bbl. unit at the Colombia refinery at Omnium International de Petroles at Ploesti, Rumania. The unit takes overhead 90 per cent by volume and makes a total of eight cuts, seven overhead and one residuum bottom cut. The overhead cuts are light gasoline, heavy gasoline, naphtha, light kerosene, heavy kerosene, light gas oil and heavy gas oil.

MUST REPORT DELIVERIES

Transportation companies are required to report all deliveries of gasoline and lubricating oil in Alabama, according to a ruling of the state's attorney general. The attorney general in reply to a question by the State Tax Commission ruled that there is no provision in the state law exempting express companies handling quantities of 10 gallons or less.

High Spots in Field News

KANSAS

Ritz-Canton-Decker area potential shows decline of 25,000 bbls. in month. State potential 148,100 bbls.

NORTH LOUISIANA-ARKANSAS-MISSISSIPPI

Good gas well in North Sabine Parish attracts Louisiana operators. Jackson County, Mississippi, has large gasser.

SOUTHWEST TEXAS

Wells in Pettus extension, west end, stop flowing. Disappointment in Escobas Pool. New interest in Starr County.

EAST TEXAS

New conservation rules effective. Now 4,450 completed wells, with 82 locations made and 80 completions during week.

GULF COAST

Rabbs Ridge interest in negotiation. Montgomery County continues in spotlight. To resume at Mykawa. More activity reported.

ROCKY MOUNTAIN AREA

Hobbs operators get counter proposal; may withdraw on six months notice. Show of oil near Denver. Good Frannie Dome well.

CALIFORNIA

Pacific Coast production at standstill until prospective legislation is out of way. Continued decline expected with some exceptions.

OKLAHOMA

Oklahoma City's allowable increased; may produce 105,000 bbls. last half of month. Increased water intrusion in lower Simpson and lime areas.

WEST TEXAS

Northern Ector County test encounters sulphur water but may be plugged back as gas well. Irion County active. Deep drilling around Reagan County.

PERFECT DEODORIZING PROCESS

NEW YORK, Mar. 12.—Anglo-Persian Oil Co., Ltd., and Dr. A. E. Dunstan have been issued a British patent for a process covering the deodorizing treatment of petroleum and petroleum distillates.

In the deodorizing treatment by the litharge process, it is stated, oils containing organic sulphur compounds, and especially some types of crude, do not show complete "sweetening," due to the presence of a minute proportion of mercaptans and sulphides remaining unaffected by the doctor solution treatment.

Under the process covered in the abovementioned patent (No. 364,204) such oils are deodorized in a two-stage treatment, the first being with the sodium plumbite doctor solution, and the second with chlorine or with a chlorine compound such as sodium hypochlorite. By this process, it is stated, the mercaptans and sulphides are virtually eliminated and the treated oil thus effectively sweetened.

DAVID LYON JACOBSON DEAD

David Lyon Jacobson, chemical engineer for the Koppers Research Corp., of Pittsburgh, Pa., died on March 6 of pneumonia. Mr. Jacobson, an authority on the purification of gas, was born in Jersey City, N. J., in 1892. He was educated at Columbia College in New York and the Massachusetts Institute of Technology where he received the degree of bachelor of science in chemical engineering in 1916. He then entered professional work as a chemical engineer.

GENERAL WOLTERS RESIGNS

FORT WORTH, Tex., Mar. 15.—Gen. Jacob F. Wolters, commanding the National Guard troops in East Texas, has resigned to return to civil life. Col. Louis S. Davidson will succeed him in enforcing proration orders in the field. The colonel has been on duty as the general's assistant.

New Order Is in Effect in East Texas

Now 4,450 Producers in Field, With 82 Locations Made During Week and 80 Completions, Seven of Them Being Wildcat Dusters

By L. E. Bredberg

DALLAS, Tex., Mar. 14.—At 7 a.m. March 16 the Railroad Commission's new order for curtailment of production in the East Texas Field, will go into effect, this order giving the field a total daily maximum of 325,000 bbls., divided equally among the total number of producers in the field. Whether the maximum allowable would be divided by the number of completed wells in the field, or by the number of wells actually producing, has been considered, but as all completed wells have to be taken into consideration, whether they are flowing, pumping or standing without producing at the present time, they will no doubt be calculated in accordance with the total in arriving at the per well allowable.

The maximum allowable of 325,000 bbls. will remain in effect until May 1 when a hearing will be held by the commission at Austin. On the first and sixteenth of each month, the per well allowance for the 15-day period will be calculated in order to care for the newly completed wells each week. The addition of new wells during each 15-day period will cut the per well allowable but a small figure in order to hold the field to the maximum allowable. With 4,450 completed producers in the field at 7 a.m. March 12, per well allowable for the period from March 16 to April 1 will be approximately 73 bbls. The present allowable is 75 bbls. per well.

Holding down production in the district to 325,000 bbls. per day, with expansion of consumption of refined products looming on the horizon, is hoped by all producers in East Texas to bring an increase in price for the high gravity sweet crude from the district which is now bringing 83 cents per barrel. The past two weeks have been the first in many in which oil has gone to storage in the district, distribution before this, running several thousand barrels per day above consumption. Several of the major purchasing companies are now supplied with sufficient connections, while one or two others have been disposing of connections, being overloaded, but several others have been taking new connections, and are tieing into the new wells as they are completed, giving outlet to all new producers as they are completed each week.

Now 4,450 Producers

On March 12 there were 4,450 producers completed in the field, with 4,208 of these reporting production which reached 312,595 bbls., or 12,405 bbls. below the maximum allowable of the field. Forty-eight wells reported no production, 94 failed to report. Pipe line runs totaled 375,556 bbls. for the day, which was 63,000 bbls. more than the day's production, again bringing distribution above production in the district.

Upshur Extension

Eslick and others' No. 1 Whitehurst in the McKinney and Williams Survey, in the extreme southeastern tip of Upshur County, and approximately 1 mile north of the nearest producer of the Lathrop area, Gregg County, which has been the most closely watched test for the past two weeks, made a 20-minute flow through the drill stem test this week, showing for a producer, and an extension to the field. Total depth is minus 3,360 feet. Surface elevation is 342 feet. Top of the pay is considered around 3,684 feet. Cores being missed from 3,680 feet to total depth is responsible for the inability to set the absolute depth as to where the sand was first encountered. Casing has been cemented and the well is now standing shut down waiting on cement to set.

The well brings production nearer to Cranfill & Reynolds' No. 1 Rash extension well, or new pool opener, as it is considered by many, which is approximately 2½ miles farther northwest. The Cranfill & Reynolds well is pumping around 60 bbls. per day making from 5 to 10 per cent salt water. The well has to be lubricated with oil in order to bring it back on production after it is shut down, consequently is held to be located on the extreme edge of the producing area. Geologists and operators are still in doubt as to whether the well opened a distinct new pool, or is an extension well. It is producing from below the known water level in the main body of the field, and from a greater depth than the producers in the field. The Eslick well is comparable to the Cranfill & Reynolds well in these respects.

Eighty-two Locations

There were 82 locations reported for the district during the week, one of these a wildcat in Delta County. Eighty tests were completed in the district, seven of them wildcat "dusters." Two of these dry holes were in Bowie County, one in Camp, one in Delta, one in Morris, one in Red River and one in Upshur. The remaining completions were producing wells in the field.

Two interesting wildcats drilling in the southeastern part of Upshur County are MacFarland's No. 1 Willie Starr in the Charles Cooper Survey, and Wadley's No. 1 Oliver in the S. Sanders Survey. The former topped broken Pecan Gap chalk at 2,323 feet and logged the hard chalk at 2,372 feet. Surface elevation is 274 feet. The latter test topped broken chalk at 2,354 feet and hard Pecan Gap chalk at 2,435 feet. Surface elevation is 373 feet.

Gillett, Tarr and Potter are on a trade with the Amerada Petroleum Corp. to drill a test on the Kelsey structure on which the company formerly drilled its No. 1 Wade, a deep dry hole. Such second test will be interesting if drilled, and will prove whether the structure is dry.

On the southwest end of the district there are two interesting tests drilling. Merry Brothers and Perrini's No. 1 Kelly, in the M. De Los Santos Coy Survey, now drilling at 2,455 feet, and Clopton and Hawkins' No. 1 Pace in the Wesley Dikes Survey, drilling at 200 feet. Both are in northeastern Cherokee County, each approximately 1 mile from production, and having good chances for extending production into Cherokee County, which will be the fifth county to be added to the producing area of the field, if either well proves a producer.

May Extend Joiner Area

Stanolind Oil & Gas Co.'s No. 1 Siler, in the Thomas White Survey, on the southeastern edge of the Joiner area, southern Rusk County, is another test which promises to extend production in this part of the field. It topped the sand at 3,577 feet, cemented casing, drilled plug and is now preparing to drill in, showing up for an oil producer. It is located approximately 2,000 feet southeast of The Texas Company's No. 1 Price, in the same survey. The Price well was brought in as an oil producer several weeks ago.

East Texas has produced a total of around 129,000,000 bbls. of oil since its discovery in October, 1930, the Kilgore area leading with approximately 51,000,000 bbls., with the Henderson area next with around 44,500,000 bbls., and North Gregg last with 33,700,000 bbls.

EAST AND EAST CENTRAL TEXAS WILDCATS

Week Ending March 14

ANDERSON COUNTY

Company, well, farm name, section and block—	Remarks:
C. R. Wilmuth et al's No. 1 N. B. Watson, 500 ft. from W line and 4,850 ft. from N of S line of survey in 8½ of 129-ac. tract, M. Main Sur.	T.D. 1,538 ft.

ANGELINA COUNTY

Helburt et al's No. 1 Long Bell Lumber Co., 160 ft. from S line and 200 ft. from E line of Sec. 9, H.&T.B. Sur.	Location.

BOWIE COUNTY

Burnham-Robertson and Greer's No. 1 F. O. Weiss, 850 ft. from N line and 200 ft. from W line of B. H. Williams 50-ac. tract, Jessie Dean Sur.	Moving in rig.
Joiner et al's No. 1 Blackwell, 800 ft. from S line and 150 ft. from E line of 275-ac. tract, E. Dunnetelle Sur.	Bldg. derrick.
W. S. Langford's No. 1 W. W. Whybark, 300 ft. from S and W of SW cor. of J. A. Dyer Sur.	S.D. 1,880 ft.

CHEROKEE COUNTY

Bridges and Candler's No. 1 Berryman, center of Berryman tract, H. Kimble Sur.	S.D. 1,000 ft.
V. Clopton & Hawkins' No. 1 A. P. Pace, 288 ft. from N line and 330 ft. from most northerly E line of 40-ac. lease, W. Dikes Sur.	Drlg. 200 ft.
Denman et al's No. 1 Mrs. Renfroe, 330 ft. N of S line and 330 ft. E of W line of farm, Uriah Moore Sur.	Derrick.
Harper and Perkinson's No. 1 J. T. Lowery, 650 ft. from N line, 150 ft. from W line of Blk. No. 5 on a 139.6-ac. tract, 4 miles W of Troupe, C. B. Jennings Sur.	S.D. 750 ft.
Merry Bros. and Perini's No. 1 Annie Kelley, 330 ft. from N line and 443 ft. from E line of 393-ac. tract and 90-ac. lease, M. De Los Santos Coy Sur.	Drlg. 2,400 ft.
Wilson & Stubbs' No. 1 L. Robart, 450 ft. from S and 150 ft. from W line of lease, J. B. Wolfin Sur.	S.D. 2,035 ft.

DALLAS COUNTY

Long Creek Dev. Co.'s No. 1 T. J. Lupton, center of 160-ac. tract, 3½ miles N of Mesquite, J. Johnson Sur.	Rigging up.
Paris' No. 2 Wilkinson, 2,787 ft. from NW and 3,241 ft. from SW of John P. Anderson Sur.	T.D. 1,230 ft.; S.D.
Joe Wilson's No. 1 fee, 600 ft. from N line and 600 ft. from W line of 1,500-ac. tr., Jno. Scroggs Sur.	S.D. 1,150 ft.

DELTA COUNTY

Worthington et al's No. 1 Pejernett, 776 ft. from S and 150 ft. from W in E. Chick Sur., 1½ miles W of Horton	S.D. 3,315 ft.

ELLIS COUNTY

Clark-Brooks' No. 1 C. W. Golliday, 300 ft. from S line and 300 ft. from E line of tract and survey, John Bones Sur.	Underreaming 2,204 ft.
Community's No. 1 Reeves	S.D. 300 ft.
E. M. Rogers' No. 1 John Lee Winn, 1,650 ft. from E and 150 ft. from S of Orland, Orlo Wheeler Sur.	S.D. 1,435 ft.
Worthen Pet. Co.'s No. 1 Cerf, 2½ miles NE of Ennis.	T.D. 2,264 ft.

(Continued on Page 66)

DAILY AVERAGE OIL SHIPMENTS FROM EAST TEXAS

Week Ending March 7

Shipments Through Main Trunk Lines

Company, size and location—	Bbls.
Arkansas P. L. Co., 8-in., Shreveport	9,919
Atlantic P. L. Co., 10-in., Atreco	14,945
Atlas P. L. Co., 8-in., Shreveport	4,421
Gulf P. L. Co., 2-8-in., Oklahoma	9,631
Gulf P. L. Co., 2-8-in., Port Arthur	19,609
Humble P. L. Co., 2-10-in., Shreveport	34,807
Humble P. L. Co., 2-8-in., Todd	30,610
Liberty P. L. Co., 8-in., Rusk	2,209
Magnolia P. L. Co., 10-in., Center	18,219
Magnolia P. L. Co., 12-in., Corsicana	24,866
Shell P. L. Corp., 10-in., Houston	20,960
Sinclair Tex. P. L. Co., 12-in., Teague	21,777
Sun-Yount Lee P. L., 10-in., Sun City	22,712
Texas P. L. Co., 10-in., Douglass	19,629
Texas Empire P. L., 12-in., Pt. Arthur	31,401
Total	285,706

Shipments to Refineries

Arrow Ref. Co., Overton	S.D.
Beacon Ref. Co., Henderson	925
Boone Ref. Co., Arp	816
Central Ref. Co., Friars Switch	S.D.
Constantin Ref. Co., Overton	S.D.
Diamond Ref. Co., Overton	479
East Texas Ref. Co., Longview	5,654
East Texas Ref. Co., Friars Switch	2,585
Gladetex Ref. Co., Gladewater	325
Gladewater Ref. Co., Gladewater	118
Kilgore Ref. Co., Kilgore	429
Overton Ref. Co., Overton	741
Pet. Refractionating Co., Longview	S.D.
Sinclair O. & G. Co., Longview	467
Slack Ref. Co., Camp Switch	S.D.
Southern Oil Ref. Co., Reed Switch	250
Taylor Ref. Co., Tyler	S.D.
V. O. E. Ref. Co., Gladewater	S.D.
Total	12,789

Shipments by Tank Car

Tyler P. L. Co. from Tyler	257
Total	257

Total daily average distribution	298,752
Total daily average production	323,377
Daily average to storage	24,627

Locations and Completions

Locations and completions during the week, for the various parts of the district give a general idea as to which parts of the district are and have been the most active for the past months: North Gregg, 30 locations and 22 completions; South Gregg, 16 locations and 17 completions; North Rusk, 6 locations and 7 completions; South Rusk, 21 locations and 19 completions.

Smith County had only six locations and three completions, while Upshur had only two locations and six completions. This distribution is characteristic of the activities in the district for the past few months. The Gladewater area of northwestern Gregg County has been one of the most active areas in the district for the past four months.

After Governor Sterling made his second trip through the East Texas Field 10 days ago, and since the Railroad Commission has taken over the work of prorating the field, the governor and military authorities having been enjoined from interfering with production of wells in the district, the governor announced that about 50 of the national guard troops would be taken out of the district, leaving around 120 officers and enlisted men on duty to act as a police force in co-operating with the Railroad Commission to curtail the field.

By-pass Case Before Grand Jury

During the week a grand jury was in session at Longview, Gregg County, hearing the case of producers who have been accused of having and using by-passes on their well in the Gladewater area. By-

(Continued on Page 30)

Northern Ector County Test Is Failure

Will Be Plugged Back as Gas Well. Irion County Test Gets Showing. New Locations Staked in North Texas

By L. E. Bredberg
Fort Worth Bureau, The Oil and Gas Journal

FORT WORTH, Tex., Mar. 14.—Weekly Oil Corp. and others' No. 1 Cowden in Section 33, Block 43, Township 2s, T.&P. Survey, northern Ector County, the most closely watched and most interesting test in the Permian Basin for the past three months, encountered two bailers of sulphur water per hour from 4,328-40 feet this week, definitely sealing its doom as an oil producer, but leaving the alternative of plugging back to the gas showing encountered at 3,824-27 feet, and completing the test for a gasser.

Enough gas was encountered to blow the tools up in the hole, causing a long fishing job, and it is estimated this gas horizon will produce at least 2,000,000 feet per day when the test is completed. Gas from the well may be used in drilling a second test in the vicinity.

Irion County

The rig on the Stanolind Oil & Gas Co.'s No. 1 W. H. Williams in Section 1,195, T.T. Survey, Irion County, was damaged by fire and will be shut down until more new equipment can be moved in for carrying down the deep test. It was drilling at 7,420 feet when fire broke out. The Herndon Drilling Co. of Tulsa is drilling the test for Stanolind, and heavy rotary equipment, with 122-foot steel derrick, is being used.

Plymouth Oil Co. and others' No. 1 J. D. Suggs in Section 3,081, Block 28, H.&T.C. Survey, Irion County, encountered a showing of oil from 6,809-13 feet and tested 90 gallons of oil in six hours. A former showing was logged from 6,795-6,804 feet. Some gas was struck from 6,813-20 feet. It is drilling below 6,850 feet. Surface elevation is 2,355 feet.

These two tests are the third and fourth to be drilled in this county, two previously drilled proving dry and failing to pick up the deep pay horizon from which nine wells are producing in the Big Lake Field to the west in Reagan County.

Deep drilling in the counties adjacent to Reagan County is expected to be carried on from time to time by various companies which hope to pick up the deep pay sand, and open another deep producing pool. Several major companies have made extensive purchases of checkerboard acreage and blocks in Crockett County, bordering Reagan County on the south. Companies have geological parties working this county again, and several thousand acres have been leased in Blocks UV and WX, G.C.&S.F. Survey, and south of Ozona in Blocks KL and GH, in the G.C.&S.F. Survey, J. T. Gurley Survey, J. R. Brooks Survey, J. T. McIntire Survey and Block MN, G.C.&S.F. Survey.

A unitized deep test is expected to be drilled in Section 66, Block UV, G.C.& S.F. Survey. The Stanolind Oil & Gas Co., Continental Oil Co. and Sun Oil Co. hold leases in this section. The former two companies will probably drill the test.

Ten-year leases without drilling obligations, and 25-cent rentals are being taken on the majority of these leases in the county, which has been the most active county in regard to lease play in the Permian Basin for the past year and a half.

Howard County

The F. H. E. Oil Co. of Fort Worth is to drill a test on the Denman Ranch in Section 14, Block 30, Township 1s, T.&P. Survey, Howard County, an offset to the Harrison well which was recently completed for a small pumper in a new area in the eastern part of the county. The Col-Tex Refining Co. is taking the oil from this area, and the first well.

Winkler County

Sid Richardson and others' No. 1 S. M. Halley in Section 25, Block B-12, southern Winkler County wildcat, is cleaning out preparatory to making a production test. Total depth is 2,957 feet, with the hole caving badly and interrupting development of the well which has been standing with 1,000 feet of oil in the hole, and showing for an opener of a new pool in this part of the county, between the O'Brien producing area to the south in Ward County, and the Hendricks Pool to the north.

Ranger and Wichita Falls

R. D. Parker, chief supervisor of the oil and gas division of the Railroad Commission, held a hearing in Brownwood on March 12 to discuss conditions in the Burkett Pool, northern Coleman County. A group of operators in the pool claimed that before pipe lines were laid to the pool, the Arcadia Oil & Refining Co., the discoverer of the pool, had run 23,500 bbls. of oil into storage. The protesting companies sought permission to run proportionate amounts from their wells.

It was agreed at the hearing that the other operators would concede the Arcadia company 10,000 bbls. already run into storage and that three companies on offset leases would be allowed to run pro rata amounts to a total of 13,500 bbls., provided no well was permitted to produce more than 40 bbls. per day. This pool was but recently given a pipe line outlet.

The Prairie Pipe Line Co. has constructed a 2-inch line from its main carrier southwest of Graham to the Nash and Windfohr wells in Section 3,410, T.E.&L. and Allen Hines Survey, Abstract 135, and will give these wells a connection after more than a year on production. Three wells will be served by this line.

New Locations

There were two locations staked in Brown County, three in Palo Pinto and three in Shackelford County during the week. One test was completed as a "duster" in the former county.

One of the most important areas in Young County is around the Dewey Knox discovery well, northeast of Graham. Three tests are now going down in this area to test the 2,700-foot sand from which the Knox well is producing.

Deep Oil Development Co. and Lindsay Drilling Co.'s No. 1 Lease 5-A Wilson in the Chalk Hill Pool, Archer County, was drilled to a total depth of 5,750 feet, then plugged back in an effort to produce it from sand logged at 3,615-40 feet. It was shot twice at this depth and tested 2 bbls. water per hour and 20 bbls. oil daily. They are now trying for a shutoff of the water.

The Continental Oil Co. has contributed $2,500 cash for a 2,200-foot Canyon series test offsetting its D. E. Rudd lease in Block 23, Harris Subdivision, Archer County.

COMPLETIONS IN WEST TEXAS

Loving County

Adams Drilling Co.'s No. 1 Wheat, top pay 4,396 feet, shot with 200 quarts from 4,360-4,403 feet, initial production 107 bbls., total depth 4,403 feet.

COMPLETIONS IN PANHANDLE DISTRICT

Carson County

Texhoma Natural Gas Co.'s No. 1-G Gore, top pay 2,479 feet, initial production 17,600,000 feet of gas, total depth 2,680 feet.

WILDCAT OPERATIONS IN WEST TEXAS

Week Ending March 14

ANDREWS COUNTY

Company, well, farm name, section and block— Remarks—

Fuhrman Pet. Co.'s No. 1 Boner, 1,320 ft. from N and 440 ft. from W, Sec. 34, Blk. A-43, P.S.L. ..... Drlg. 1,825 ft.

BREWSTER COUNTY

Brewster Oil Co.'s No. 1 fee, 2,640 ft. S and 2,598 ft. E of NW cor., Sec. 45, Blk. G-15, G.C.&S.F. Sur. ..... S.D. 1,935 ft.

H. L. Chapman's No. 1 Skinner, C SW SE, Sec. 100, Blk. 3, G.C.&S.F. Sur. ..... S.D. 1,302 ft.

Trans-Pecos Oil & Gas Co.'s No. 1 Jones, 920 ft. from N and 2,500 ft. from E of Sec. 18, Blk. G-15, G.C.& S.F. Sur. ..... S.D. 2,900 ft.

Van McPhail's No. 1 McIntyre, SE cor., Sec. 55, Blk. 352, 7 miles south Alpine ..... S.D. 1,750 ft.

COCHRAN COUNTY

Penn Oil Co.'s No. 1 Slaughter, C Labour No. 30 of League 139, Carson County School Lands ..... T.D. 5,052 ft.

CONCHO COUNTY

Beesley et al's No. 1 Waring Estate, 400 ft. from N and E, Sec. 163, T.&N.O. Sur. ..... Drlg. 1,100 ft.

CROCKETT COUNTY

Doleman & Moore's No. 1 Ferner, 1,155 ft. from N and 1,485 ft. from E of Sec. 36, Blk. 2, I.&G.N. Sur. ..... Spudded and S.D.

CULBERSON COUNTY

Harris-Hann's No. 1 Seay, 1,980 ft. from N and E of Sec. 16, Blk. 54, P.S.L. ..... Location.

Kernrumpf et al's No. 1 Garen, 330 ft. S and W, Sec. 15, Blk. 79, Public School Land ..... S.D. 1,280 ft.

DAWSON COUNTY

Albaugh et al's No. 1 Robinson, C NW, Sec. 44, Blk. M, E.L.&R.R. Sur. ..... To resume drilling.

ECTOR COUNTY

Weekly Oil Corp. et al's No. 1 Cowden, 1,980 ft. from N and W, Sec. 33, Blk. 43, Twp. 2s, T.&P. Sur. ..... T.D. 4,430 ft.; to plug back for gas well.

H. F. Wurts' No. 1 E. A. Ibbetson et al, 330 ft. from N and E lines of NW, Sec. 16, Blk. 46, Twp. 3s, G. M. M.Br.&A. Sur. ..... S.D. 3,280 ft.

EL PASO COUNTY

Tri-State Oil Co.'s No. 1 Bobadella, 1,325 ft. from S and E lines Sur. 254, S.F. No. 7,247 ..... S.D. 2,152 ft.

FISHER COUNTY

Condor Petroleum Co.'s No. 1 Steele, 660 ft. from S and 330 ft. from W of W half of SE Sec. 210, B.B.B.&C. Ry. Sur. ..... Location.

Cranfill & Reynolds' No. 1 George, 400 ft. from N and 330 ft. from E, Sec. 200, Blk. 1, B.B.B.&C. Sur. ..... Drlg. 4,190 ft.

Southern Oil Corp. of America's No. 1 Wm. Flannigan, 240 ft. from E and 165 ft. from W line of S 20 acres of SW, Sec. 20, B.B.B.&C.R.R. Sur. ..... Drlg. 2,660 ft.

GLASSCOCK COUNTY

Mann et al's No. 1 fee, 330 ft. from N and 1,980 ft. from E, Sec. 27, Blk. 34, Twp. 3s, T.&P. Sur. ..... Fishing 900 ft.

(Continued on Page 69)

WILDCAT OPERATIONS IN TEXAS PANHANDLE

Week Ending March 14

BRISCOE COUNTY

Company, well, farm name, section and block— Remarks:

Humble O. & R. Co.'s No. 1 C. Adair est., 2,500 ft. from N line and 2,100 ft. from E line of Sec. 7, Blk. G-6 .. S.D. 725 ft.

CARSON COUNTY

Continental Oil Co.'s No. 4 Block, 330 ft. from N, 990 ft. from E, Sec. 111, Blk. 4, I.&G.N. Sur. ..... T.D. 2,969 ft; pulling big pipe.

H. A. M. Oil Co.'s No. 2 Cooper, 330 ft. from S and E Sec. 5, Blk. 9, I.&G.N. Sur. ..... Location.

Skelly Oil Co.'s No. 27 Schaffer, 1,265 ft. from S and 440 ft. from W, Sec. 88, Blk. 4, I.&G.N. Sur. ..... Drlg. 1,085 ft.

Texhoma Nat. Gas Co.'s No. 1-S Burnett, center SE, Sec. 94, Blk. 5, I.&G.N. Sur. ..... Drlg. 225 ft.

CHILDRESS COUNTY

C. L. Sloan et al's No. 1 B. P. Smith, Sec. 49, F. P. Knott lands ..... T.D. 5,000 ft.

COLLINGSWORTH COUNTY

Dixon et al's No. 1 Bell, 330 ft. N, 1,320 ft. W, Sec. 102, Blk. 21, H.&G.N. Sur. ..... S.D. 2,508 ft.

Downey et al's No. 1 Beasley, SE cor. SW SE, Sec. 95, Blk. 15, H.&G.N. Sur. ..... Rigging up.

DEAF SMITH COUNTY

Western Union Oil Co.'s No. 1 Farwell, C NW, Sec. 18-3n-2e ..... S.D. 275 ft.

GRAY COUNTY

Back & Barber's No. 1 Back, 660 ft. from S and 330 ft. from W, Sec. 140, Blk. 25, H.&G.N. Sur. ..... Drlg. 2,225 ft; S.G. 2,210-30 ft.

Boyes et al's No. 1 Colebank-Morse, 330 ft. NE, Sec. 65, Blk. 25, H.&G.N. Sur. ..... Spudded and S.D.

Brown et al's No. 1 Duncan, 330 ft. S and E, NW, Sec. 93, Blk. 3, I.&G.N. Sur. ..... S.D. 3,427 ft.

Danciger O. & R. Co.'s No. 3 Byrum, 330 ft. from N line, 330 ft. from E line, Sec. 138, Blk. 3, T.&N.O. Sur. .. Drlg. 2,740 ft.

R. B. Etter et al's No. 1 Chapman, 275 ft. from N line and 110 ft. from W line of S½ SW, Sec. of Blk. 26, H.&G.N. Sur. ..... Spudded 50 ft.

Foster's No. 1 Webb, 330 ft. from S and W, Sec. 42, Blk. 25, H.&G.N. Sur. ..... Spudded.

Graham et al's No. 1 Barrett, 990 ft. from N and 330 ft. from E, Sec. 112, Blk. 3, I.&G.N. Sur. ..... Location.

Gulf Oil Corp.'s No. 1 Catlin, 2,310 ft. from N line, 330 ft. from E line, Sec. 27, Blk. 3, I.&G.N. Sur. ..... Drlg. 3,080 ft; T.P. 2,975 ft; 1-100 ft. oil in hole.

Jean Pet. Co.'s No. 1 Furneaux Bros., 330 ft. N and W, cor. SE, Sec. 200, Blk. 2-B, H.&G.N. Sur. ..... S.D. 3,010 ft.; cleaned up fishing job.

Jewel Oil Co.'s No. 1 Meers, 330 ft. from S and W of NW SW, Sec. 196, Blk. 3, I.&G.N. Sur. ..... T.D. 3,169 ft; T.P. 3,133 ft.

Nelson et al's No. 1 Crews, 330 ft. S and E, NW, Sec. 12, Blk. 25, H.&G.N. Sur. ..... S.D. 2,620 ft.; estimated 4,000,000 ft. gas.

Nipper et al's No. 1 Morse, 330 ft. from N and E, Sec. 1, Blk. 26, I.&G.N. Sur. ..... S.D. 2,600 ft.; show oil 2,525-40 ft.

(Continued on Page 70)

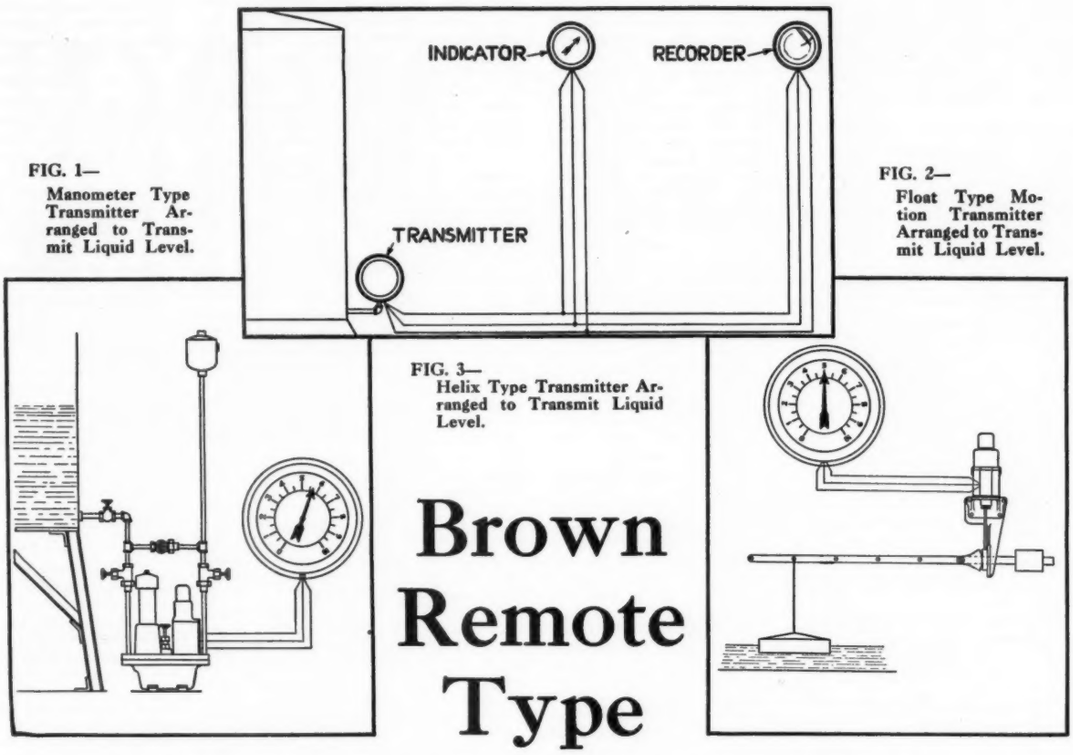

FIG. 1— Manometer Type Transmitter Arranged to Transmit Liquid Level.

FIG. 2— Float Type Motion Transmitter Arranged to Transmit Liquid Level.

FIG. 3— Helix Type Transmitter Arranged to Transmit Liquid Level.

Brown Remote Type

Liquid Level Gauges Made in Three General Types

MANOMETER TYPE. Operates with manometer type transmitter. Changes in hydrostatic pressure, produced by changes in the liquid level being measured, cause corresponding fluctuations in the level of a body of mercury carrying a float and supporting an armature in an inductance coil. The motion of this armature is duplicated in the receiving instrument, and is converted into accurate indications or record of the changes in liquid level affecting the transmitter. Illustrated by Fig. 1.

FLOAT TYPE. Operates by means of float actuating Brown motion transmitter. Changes in the float level alter, through a suitable reduction gear, the position of an armature within an inductance coil inside the motion transmitter case. The motion of this armature is duplicated in the receiving instrument, and is converted into accurate indications or record of the changes in liquid level affecting the transmitter. See Fig. 2.

HELIX TYPE. Operates with helix type transmitter. Changes in hydrostatic pressure, produced by changes in the liquid level being measured, cause expansion or contraction of a specially designed helix actuating an armature within an inductance coil inside the transmitter case. The motion of the armature is duplicated in the receiving instrument. See Fig. 3.

Indicating, recording and automatic control models. For full details get Brown Remote Type Catalog No. 7501.

THE BROWN INSTRUMENT COMPANY
4488 Wayne Ave., Phila. Pa.

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Brown Instruments

"to measure is to economize"

CANADIAN FIELDS

(Continued from Page 40)

wells, including several in the south field, have been drilled much deeper into the lime without encountering crude oil; and in the Central Field, McLeod Oil Co.'s No. 4 encountered a second wet gas and crude naphtha horizon some 1,250 feet in the lime. The crude oil showing in Miracle's No. 3 may, however, lead to the deepening of other tests in the same area in the hope of tapping the long-sought crude oil reservoir.

South Turner Valley

In the Mercury tract, South Turner Valley, Hylo Oils' No. 1, LSD 12, Section 4-19-2w5, offsetting Mercury's No. 1 producer, is standing with 6¼-inch casing cemented in the top of the lime at 5,501 feet. The test will resume drilling in a few days. It has been bailing about 65 bbls. of light crude daily from the Home sand while drilling.

Central Turner Valley

In the Central Turner Valley, McLeod Oil Co.'s No. 1, LSD 16, Section 1-20-3w5, has sidetracked lost tools to within about 70 feet of the old bottom in the lime and is running 6⅝-inch casing before drilling into the porous horizon. There is sufficient gas accumulation in the well to interfere with drilling, and a fair crude naphtha recovery is already indicated.

1931 Official Totals

Complete official figures of the petroleum production for all Canada for the year 1931 are now available, and show a total output of 1,583,327 bbls. This compares with the earlier official estimate of 1,554,600 bbls., the actual returns showing a considerable gain over the estimated figure. It also compares with an officially recorded production for all Canadian fields in 1930 of 1,522,220 bbls. The 1931 figures thus represents a gain of 61,107 bbls. over the previous year, and establishes a new high for Canadian crude oil production.

The revised official figures show the following comparative totals for the various provinces:

	1931	1930
New Brunswick	6,577	6,758
Ontario	121,555	117,302
Alberta	1,455,195	1,398,160

The 1931 figures for Alberta are made up as follows: Turner Valley, naphtha, 1,345,689 bbls.; Turner Valley, light crude, 26,936 bbls.; Red Coulee, light crude, 65,066 bbls.; Ribstone, heavy crude, 10,362 bbls.; Wainwright, heavy crude, 7,142 bbls.

A noteworthy feature is the reversal of the previous trend in the Ontario fields, where, despite lower prices, a small gain was shown over the previous year's production.

The official figures show that December production in all Canada amounted to 106,201 bbls., comparing with 99,037 bbls. in November and 182,638 bbls. in December, 1930. In December Alberta wells produced 90.5 per cent of the total output, Ontario wells 9.1 per cent and New Brunswick wells 0.4 per cent. The New Brunswick output in December was 468 bbls.; Ontario, 9,621 bbls., and Alberta, 96,112 bbls., the latter including 87,511 bbls. Turner Valley naphtha, 3,590 bbls. Turner Valley light crude, 4,069 bbls. Red Coulee light crude, 603 bbls. of Ribstone heavy crude and 339 bbls. of Wainwright heavy crude.

Natural Gas Production

Official figures show that Canada's natural gas production for the year 1931 aggregated 26,628,355,000 feet, compared with 29,376,919,000 feet in the year 1930. The production of natural gas for all Canada in December reached 2,899,290,000 feet, compared with 2,539,948,000 feet in November and 3,102,757,000 feet in December, 1930. Alberta wells yielded 69.8 per cent of the December output; Ontario wells, 27.8 per cent, and New Brunswick wells, 2.4 per cent. The average quantity of Turner Valley gas required to produce a barrel of naphtha in December was 136,000 feet. The average daily gas production in the Turner Valley Field was 382,000,000 feet, of which quantity it is estimated that 40,210,000 feet was utilized. Mixed gas (natural and artificial) imported into Canada in December reached a total of 8,507,000 feet valued at $6,797, while imports in the year 1931 totaled 109,168,000 feet worth $74,904.

Turner Valley Conservation

No definite action has yet taken place in regard to the various proposals for unit operation or conservation of the Turner Valley Field. The pooling agreement proposed some weeks ago by the Calgary & Edmonton Corp. is being discussed by the various interested concerned. It has been accepted in principle by Imperial Oil, Ltd., Royalite Oil Co. and the greater part of the associated or subsidiary interests. On the other hand, the Calgary & Edmonton proposal has been definitely rejected by A. H. Mayland, president of Mercury Oils, Ltd., and Harvey S. Price, field manager for the East Crest Oil Co., in behalf of their companies, which are the largest independent producers in the field. Both these operators favor the original Fisher unitization scheme, claiming it is fairer to the independent operators. The Calgary & Edmonton scheme has also been considered by a special committee representing the independent operators and headed by Hon. Herbert Greenfield. This committee is now preparing its report, which, it is understood, will recommend the rejection of the proposal.

Imperial Oil, Ltd., which has tentatively accepted the Calgary & Edmonton proposal, definitely rejected the original Fisher agreement.

At the present time the Turner Valley Field is producing around 380,000,000 feet of gas per day, of which a maximum of perhaps 55,000,000 feet is commercially utilized. The peak may run higher but the average consumption is considerably lower than that figure, though some gas, about 5,000,000 feet a day, is being stored in the Bow Island Field. While the government some time ago fixed a maximum permissible flow of 100,000,000 feet a day from the entire field, to be prorated among the various companies, this has not been enforced.

Statement by J. H. McLeod

The most important restriction on the field is that imposed for the first time last summer by Imperial Oil, Ltd., on deliveries to the Royalite pipe line. These deliveries were, beginning with July, 1931, limited to 50 per cent of the June deliveries, and this policy has been steadily enforced. Discussing this matter a recent statement of J. H. McLeod, production manager of Imperial Oil, Ltd., said:

"When the market situation in western Canada necessitated a restriction in the daily production purchased from the Turner Valley Field, Imperial Oil made an impartial proration of the monthly requirement and arranged to purchase from all companies whose product was delivered to them on the basis of a 50 per cent reduction of June, 1931, deliveries from these companies, regardless of whether the company was, or was not, associated in any way with the Imperial interest, and no variation of this policy has since taken place except so far as new wells have necessitated a further uniform reduction. This policy has been pursued in spite of the fact that the company could have satisfied its requirements from its own wells. It has, of course, been necessary, where companies have exceeded their prorated allowance by direct sales, to deduct such sales from their allowance, in order that no hardship be imposed on those companies without any direct outlet."

Although the Alberta legislature is now in session, government conservation measures have been deferred pending a possible voluntary agreement among the various interests concerned. It has been intimated, however, that unless such a voluntary agreement is reached by practically all interests, the government will at the present session proceed with legislation designed to regulate and conserve the natural resources of Turner Valley. Earlier in the year the government was reported to be studying the details of its proposed conservation measure. No details of the proposed scheme have been made public. The government would undoubtedly prefer to have the operators take the problem off its hands by agreeing upon a reasonably effective conservation plan of their own. If this is not done, however, the government will, it is understood, bring down legislation within a couple of weeks. This legislation is expected to embody a permissible maximum flow for the field prorated among the various producers, though this permissible maximum may be higher than the previously suggested figure of 100,000,000 feet a day. It is proposed to refer the legislation to a committee of the entire legislature, when all interests concerned will have ample opportunity to make representations regarding it.

In the meantime, petitions are being actively circulated and largely signed asking the government to suspend gas conservation plans until the possibilities of marketing or otherwise utilizing the gas have been fully explored, or until present economic conditions show improvement.

Border Fields

On the Twin River structure, southeast of Lethbridge, Parco Oil Co.'s No. 1, LSD 16, Section 34-1-20w4, is unofficially reported to have been given a shot. On the pump the well made a steady production of around 10 bbls. a day of 31.5 gravity crude from the top of the Madison lime at about 3,890 feet. The hole is being cleaned out for a further test, and may prove a fair commercial producer.

On the Lethbridge structure, farther north and west, Texas-Imperial's No. 1, LSD 14, Section 22-8-22w4, is standing at 4,574 feet, having encountered water after drilling 23 feet below the point where oil was struck in the top of the Madison. Decision as to future operations is awaiting the arrival of a representative of the Texas Oil Co. of Canada, which was jointly interested with Imperial Oil, Ltd., in the drilling test and the adjacent acreage.

Some 15 miles farther northwest, Hudson's Bay Oil & Gas Co.'s No. 1 Keho, LSD 2, Section 17-11-22w4, is reported preparing to resume as soon as the weather moderates. Before the shutdown, the hole was cemented back to 4,800 feet, and will sidetrack lost tools before testing the oil show encountered in the top of the Madison at 4,920 feet.

On the Milk River structure, Commonwealth Petroleums' No. 1, LSD 8, Section 9-3-15w4, is shut down at 5,240 feet with a hole full of water. No further work will be done until the weather moderates. Cores from the Devonian lime showed traces of oil but nothing approaching commercial production, and when work halted the drill had passed out of the lime into about 20 feet of shale. The most recent objective of the test was between 5,450 and 5,500 feet, and it is expected the later drilling will be continued to this depth at least.

Tests in the Foothills

In the Moose Mountain area, west of Calgary, Elbow Oils' No. 1, LSD 11, Section 35-22-5w5, has resumed work at 3,340 feet after a prolonged shutdown. Some difficulty has been experienced with a crevice which started a crooked hole, and the well was shot and plugged back. The Home sand, which is a potential producing horizon in this area, is looked for in a few hundred feet.

On the High River-Aldersyde structure, south of Calgary, Ranchmen's Gas & Oil Co.'s No. 1, LSD 16, Section 13-20-29w4, is again drilling and making new hole around 5,420 feet.

Red Coulee Producer

On the Montana end of the international Red Coulee Field, Cosmo Petroleum Co.'s No. 3 Iowa, NE SE, Section 2-37-4w, is reported to have swabbed slightly better than 100 bbls. a day when first placed on production and is now reported pumping around 60 bbls.

Canadian Exploration Operations

Announcement is made that Canadian Exploration Co. of Denver, Colo., headed by Col. A. E. Humphreys, is continuing exploration work in Alberta, but that no new drilling will be undertaken.

One test on the Duvernay structure north of Edmonton, LSD 5, Section 34-55-12w4, was discontinued at 2,417 feet. While no further drilling operations were undertaken there, it is understood the test disclosed some rather encouraging features.

British Columbia Test

Announcement is made that Pacific Petrol Products' No. 1, near Dorr, British Columbia, is to be completed by the United Development Co. The Dorr test has been standing for a number of months at 820 feet. Location is on the Tobacco Plains in southeastern British Columbia, not far from the Washington boundary.

Manitoba Drilling

In the Manitou district, southwestern Manitoba, Commonwealth Petroleums' No. 2, LSD 2, Section 26-2-9WPM, is reported drilling close to 1,500 feet on a test for gas.

Ontario Drilling

In the Dawn Field, Lambton County, Dawn Oil & Gas Co.'s No. 1, NE Lot 25, Concession 11, Sombra Township, started work this week on a test of the Dawn gas sand.

In the Norfolk gas area south of Tillsonburg, Ajax Oil & Gas Co. has finished a test in South Middleton Township. The well was shot and proved a small gasser in the Clinton sand between 1,242 and 1,260 feet. Location was on the Horton farm about 3 miles east of one of the Acme Gas & Oil Co. producers.

Dominion Natural Gas Co.'s No. 1 test on the W. F. Kingston farm, recently finished, is reported to show a production of 325,000 feet a day. Dominion's No. 2 has been started, landing the drive pipe at 230 feet.

Red Coulee Test

On the Alberta end of the international Red Coulee Field, O. R. Lang has obtained a contract to complete Devonshire Oils' No. 1, LSD 3-4, Section 10-1-16w4. This test, started a couple of years ago by Devonshire Oils, Ltd., of Calgary, has been standing since June, 1931, at a depth of about 1,930 feet, and is reported cased to 1,180 feet. Production is looked for around 2,550 feet. The location is somewhat north of the group of producing wells on the Alberta side of the boundary. It is reported that the hole is being cleaned out and drilling resumed. This will be the first drilling activity in the Canadian end of the field for a number of months.

Fort Norman Field

Imperial Oil, Ltd., is reported checking up on its far north production in the Fort Norman Field, with a view to utilizing gasoline from the Fort Norman wells in connection with the new mineral development in the Great Bear Lake area east of Fort Norman. Ronald McKinnon of the Imperial staff arrived at the end of steel, at Warterways, recently, from which point he was to proceed by airplane to Fort Norman. The remaining 53 miles of the trip would be made by dog team. The object is to conduct a survey of the present condition of the two producing wells. These some years ago were rated good for a daily production of between 50 and 75 bbls each; and if the test shows satisfactory conditions, steps will probably be taken this season to utilize the production. It is understood that a small portable refining plant was taken in at the time of the Fort Norman boom some 10 years ago but whether this is still on the ground is not known.

WELLMAN HEADS OIL GROUP

NEW YORK, Mar. 14.—More than 250 members of the Oil Trades Association attended the annual dinner and meeting of that organization and elected officers for the coming year as follows: Clifford T. Wellman, president; William S. Williams, vice president; Joseph C. Smith, secretary; Philip C. Meon, treasurer. The board of directors includes Albert J. Squire, George Surand, Edwin Stern, W. H. Correa, J. W. Saybolt, H. Mart Smith, John W. Baker and D. T. Bloodgood. All the members are oil engineers, chemists or members of industrial oil companies. The purpose of the organization is the promotion of the use of oils in other industries and the exchange of discoveries in oil science between laboratories and sales organizations.

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EAST TEXAS FIELDS

(Continued from Page 25)

passes have drawn considerable attention to the possibilities of running more oil than allowed from a well, and not accounting for the excess. Oil and gas associations operating in the district and State are to co-operate in ferreting out such methods of producing wells and help prosecute such violators. Some of the land and royalty owners in the district have hired their own gaugers to prevent theft of their oil by such methods.

It is understood that the attorney general's department has obtained injunctions against seven more operators in the district, preventing them from violating the Railroad Commission's orders, thereby strengthening that body's efforts and position in regard to curtailing the field. One operator who had filed an injunction against the commission, withdrew such action.

The Sinclair Oil & Gas Co. is laying between 4 and 5 miles of 6⅝-inch casing from the Peyton Brothers' 60,000,000-foot dry gas well in the extreme southern end of the Joiner area, Rusk County, and will use gas from this well to drill and produce some of its leases to the north. The company is also drilling a north offset test to the big gasser, and will no doubt have another large supply of gas from this well when it is completed. There is one other dry gasser in this area, Stanolind Oil & Gas Co.'s No. 1 Lacy, a little over a mile southwest of the first gasser.

Robinson and Greer of Shreveport have assembled a 10,000-acre block centering around the J. Dean Survey in the northwestern part of Bowie County, half of this block falling over in Red River County. Forty-five hundred acres have been turned to Joe Burnham of Fort Worth who will drill a test on the block.

K. A. Spitznagel has renewed leases on a 9,000-acre block in the northwestern part of Sabine County, centering around the John Horton Survey, and has staked location for a test 319 feet south of the center of the north line of the Horton Survey. He is moving in tools. Rogers, Chapman and others started a test on the Polley farm in this survey but failed to carry out contract and leases expired.

Falls County

Nelson and others have purchased 10 acres in the P. Zarza Survey from the Dixie Oil Syndicate, and are now drilling approximately 1,000 feet northwest of the discovery well on the J. Lee Davis farm. At the present time there are seven active operations and five locations in the county.

W. L. Miller of Fort Worth is assembling 20,000 acres centering around J. M. Viesca and M. Grande Survey, between New Braden and Eden, in Robertson County, and will start a 4,000-foot test in 60 days.

COMPLETIONS IN EAST TEXAS

Bowie County

Logan and Elliott's No. 1 J. W. Smith, dry and abandoned, total depth 4,503 feet.

Lee Timberlake's No. 2 Tidwell, dry and abandoned, total depth 3,000 feet.

Camp County

Monitor Oil Co.'s No. 1 G. L. Merrill, dry and abandoned, total depth 4,530 feet.

Delta County

Commerce Oil Co.'s No. 1 Abolwich, dry and abandoned, total depth 3,315 feet.

Gregg County

Fred J. Adams, Jr.'s No. 1 Shilo Church, top sand 3,568 feet, initial production 80 bbls. per hour through 1-inch tubing choke, total depth 3,595 feet. Alco Royalty Co.'s No. 2 R. P. Johnson, top sand 3,599 feet, initial production 75 bbls. per hour through 1-inch tubing choke, total depth 3,615 feet. Arkansas Fuel Oil Co.'s No. 4-B McPherson, top sand 3,597 feet, initial production 45 bbls. in one-quarter hour through open tubing, total depth 3,537 feet. Atlantic Oil & Production Co.'s No. 4 Dunikin, top sand 3,608 feet, initial production 110 bbls. in one hour through 1-inch tubing choke, total depth 3,679 feet.

Barnsdall Oil Co.'s No. 7 Adams, top sand 3,634 feet, initial production 34 bbls. in one-quarter hour through 1-inch tubing choke, total depth 3,672 feet.

Beard and others' No. 1 J. J. Fuller, top sand 3,686 feet, initial production 65 bbls. per hour through three-quarters-inch tubing choke, total depth 3,721 feet.

Cherokee Chief Oil Co.'s No. 2 Johnson, top sand 3,650 feet, initial production 35 bbls. in one-quarter hour through open tubing, total depth 3,670 feet.

Columbia Oil & Gas Co.'s No. 3-A J. B. Doby, top sand 3,540 feet, initial production 75 bbls. in one-half hour through open tubing, total depth 3,591 feet.

Empire Gas & Fuel Oil Co.'s No. 2 A. Green, top sand 3,595 feet, initial production 43 bbls. in one-quarter hour through open tubing, total depth 3,650 feet.

Ralph Fenton's No. 1 Alexander, top sand 3,536 feet, initial production 28 bbls. in 17 minutes through 1-inch tubing choke, total depth 3,556 feet.

F. H. E. Oil Co.'s No. 5 J. Flemster, top sand 3,595 feet, initial production 75 bbls. per hour through 1-inch tubing choke, total depth 3,625 feet.

Gulf Production Co.'s No. 6 L. Sneider, top sand 3,516 feet, initial production 130 bbls. per hour through three-quarters-inch tubing choke, total depth 3,534 feet.

Humble Oil & Refining Co.'s No. 6 W. R. Hughes, top sand 3,655 feet, initial production 65 bbls. per hour through three-quarters-inch tubing choke, total depth 3,693 feet.

Jones and O'Brien's No. 3 McHenry-Loeb, top sand 3,523 feet, initial production 50 bbls. in one-quarter hour through open tubing, total depth 3,556 feet.

Pilot Oil Co.'s No. 1 G. S. Maddox, top sand 3,609 feet, initial production 30 bbls. in one-half hour through 1-inch tubing choke, total depth 3,650 feet.

Roeser and Pendleton's No. 1-A E. Nichelson, top sand 3,654 feet, initial production 90 bbls. in 43 minutes through open tubing, total depth 3,672 feet.

Satellite Oil Co.'s No. 4 L. M. Colburn, top sand 3,532 feet, initial production 75 bbls. per hour through 1-inch tubing choke, total depth 3,567 feet.

Selby and Lewis' No. 4-C Snavely heirs, top sand 3,570 feet, initial production 50 bbls. in one-quarter hour through open tubing, total depth 3,588 feet.

Shell Petroleum Corp.'s No. 6 Richey, top sand 3,547 feet, initial production 40 bbls. per hour through tapered tubing, total depth 3,652 feet.

J. R. Smith's No. 3 J. B. Doby, top sand 3,508 feet, initial production 10 bbls. in five minutes through 1-inch tubing choke, total depth 3,514 feet.

Simms and Stanolind Oil & Gas Co.'s No. 3 Tuttle, top sand 3,545 feet, initial production 75 bbls. in one-quarter hour through open tubing, total depth 3,578 feet.

Tidal Oil Co.'s No. 6 A. F. Sheppard, top sand 3,524 feet, initial production 52 bbls. in 30 minutes through open tubing, total depth 3,644 feet.

Arkansas Fuel Oil Co.'s No. 2 G. Donaldson, top sand 3,570 feet, initial production 25 bbls. in 30 minutes through 1-inch tubing choke, total depth 3,600 feet.

Byrd-Frost Oil Co.'s No. 1-A J. B. Watson, top sand 3,542 feet, initial production 75 bbls. per day pinched, total depth 3,607 feet.

Gulf Production Co.'s No. 7 Alexander, location abandoned; No. 2 A. A. King, top sand 3,530 feet, initial production 8 bbls. per hour through three-fourths inch tubing choke, total depth 3,568 feet; No. 1 R. H. Still, top sand 3,555 feet, initial production 75 bbls. per hour through three-fourths inch tubing choke, total depth 3,569 feet.

John Roberg's No. 1 C. H. Blackman, top sand 3,698 feet, initial production 75 bbls. per day pinched, total depth 3,701 feet.

Bill McCulloch's No. 2 G. M. Strong, top sand 3,710 feet, initial production 20 bbls. per hour through three-fourths inch tubing choke, total depth 3,718 feet.

Magnolia Petroleum Co.'s No. 3 John Redford, top sand 3,596 feet, initial production 100 bbls. per hour through 1-inch tubing choke, total depth 3,608 feet.

Merren and Mays' No. 2 Dansby, top sand 3,691 feet, initial production 75 bbls. per day pinched, total depth 3,696 feet.

J. B. Hughes' No. 1 A. A. King, top sand 3,709 feet, initial production 40 bbls. in 13 minutes through three-fourths inch tubing choke, total depth 3,713 feet.

Producers Investment Corp.'s No. 3 J. A. Butts, top sand 3,539 feet, initial production 80 bbls. per hour through 1-inch tubing choke, total depth 3,602 feet.

Shell Petroleum Corp.'s No. 11 W. W. Elder, top sand 3,564 feet, initial production 17½ bbls. in 30 minutes through 3-inch tapered tubing, total depth 3,621 feet; No. 5 E. W. Willoughby, top sand 3,526 feet, initial production 12½ bbls. in 30 minutes through 3-inch tapered tubing, total depth 3,574 feet.

The Texas Company's No. 2 Walls, top sand 3,642 feet, initial production 105 bbls. per hour through three-quarters-inch tubing choke, total depth 3,659 feet.

Tidal Oil Co.'s No. 3 M. B. Huey, top sand 3,474 feet, initial production 210 bbls. per hour through open tubing, total depth 3,490 feet.

Welch and Sandler's No. 1 D. Barnett, top sand 3,739 feet, initial production 20 bbls. in one-half hour through various chokes, total depth 3,743 feet.

Whittle and Cavanaugh's No. 2 Rose Brown, top sand 3,567 feet, initial production 75 bbls. per day through various chokes, total depth 3,583 feet.

Morris County

Dumas and others' No. 1 Tom Ball, derrick abandoned.

Red River County

Harris and Joiner's No. 1 Howison, dry and abandoned, total depth 1,940 feet.

Rusk County

Gulf Production Co.'s No. 4-A C. E. Christian, top sand 3,607 feet, initial production 70 bbls. per hour through three-quarters-inch tubing choke, total depth 3,645 feet.

Humble Oil & Refining Co.'s No. 1 T. Barton, top sand 3,651 feet, initial production 62 bbls. per hour through 2-inch open tubing, total depth 3,740 feet.

K. & P. Oil Co.'s No. 3 Brock Estate, top sand 3,645 feet, initial production 75 bbls. per day pinched, total depth 3,657 feet.

Magnolia Petroleum Co.'s No. 3 M. E. Peterson, top sand 3,651 feet, initial production 37 bbls. in five minutes through three-quarters-inch tubing and 3-inch choke on casing, total depth 3,653 feet.

Republic Production Co.'s No. 3 B. F. Hinman, top sand 3,625 feet, initial production 30 bbls. in one-quarter hour through 1½-inch tubing choke, total depth 3,633 feet.

Shell Petroleum Corp.'s No. 9 W. P. Moore, top sand 3,727 feet, initial production 18 bbls. in one-half hour through tapered tubing, total depth 3,740 feet.

Tidal Oil Co.'s No. 4 Terrell, top sand 3,682 feet, initial production 75 bbls. per day pinched, total depth 3,685 feet.

Ajo Oil Corp.'s No. 3 Saunders, top sand 3,676 feet, initial production 65 bbls. in one-half hour through tubing, total depth 3,701 feet.

Crabtree-Foster and others' No. 2 Giles, top sand 3,68[illegible] feet, initial production 62 bbls. per hour through open tubing, total depth 3,71[illegible] feet.

East Texas Refining Co.'s No. [illegible] Grissom, top sand 3,667 feet, initial production 60 bbls. in 20 minutes through open tubing, total depth 3,675 feet.

Golding and Murchison's No. 2-C E. L. Pinkston, top sand 3,637 feet, initial production 85 bbls. per hour through open tubing, total depth 3,714 feet.

Grayburg No. 5 Kangerga, top sand 3,669 feet, initial production 75 bbls. in one-half hour through open tubing, total depth 3,69[illegible] feet.

Gulf Production Co.'s No. 7-B Id[illegible] Holt, top sand 3,807 feet, initial production 85 bbls. per hour through three-quarters-inch tubing choke, total depth 3,813 feet; No. 2 Hoxie Johnson, top sand 3,756 feet, initial production [illegible] bbls. per hour through three-quarters-inch tubing choke, total depth 3,762 feet.

Humble Oil & Refining Co.'s No. 3-C Id[illegible] Holt, top sand 3,721 feet, initial production 42 bbls. in one-half hour through three-quarters-inch tubing choke, total depth 3,787 feet; same company's No. 3 Pilgren, top sand 3,706 feet, initial production 43 bbls. in one-half hour through three-quarters-inch tubing choke, total depth 3,803 feet; same company's No. 2-B R. E. Silvey, top sand 3,580 feet, initial production 41 bbls. in one-half hour through three-quarters-inch tubing choke, total depth 3,694 feet.

Lion Oil & Refining Co.'s No. 6 [illegible] Brooks, top sand 3,630 feet, initial production 40 bbls. per hour through tubing choke, total depth 3,724 feet.

Mid-Kansas Oil & Gas Co.'s No. 3 M. C. Do[illegible] Guerin, top sand 3,594 feet, initial production 110 bbls. per hour through 1-inch tubing choke, total depth 3,843 feet.

Prairie Oil & Gas Co.'s No. 6 J. [illegible] Wilson, top sand 3,627 feet, initial production 80 bbls. per hour through three-quarters-inch tubing choke, total depth 3,634 feet.

Sayre Oil Co.'s No. 4 Sam Stone, top sand 3,638 feet, initial production 60 bbls. in one-half hour through open tubing, total depth 3,662 feet.

Sinclair Oil & Gas Co.'s No. 5-B Mayfield, top sand 3,626 feet, initial production 45 bbls. in one-half hour through open tubing, total depth 3,635 feet.

Sun Oil Co.'s No. 3 Mrs. A. Barksdale, top sand 3,787 feet, initial production 11[illegible] bbls. per hour through open tubing, total depth 3,635 feet; No. 4 S. A. Selmar top sand 3,630 feet, initial production 8[illegible] bbls. per hour through open tubing, total depth 3,680 feet.

Tex-Jersey Oil Co.'s No. 2-A W. P. Keeling, top sand 3,752 feet, initial production 60 bbls. in one-half hour through open tubing, total depth 3,761 feet.

Grady Vaughan's No. 3 Reagan, top sand 3,697 feet, initial production 90 bbls. in one-half hour through open tubing, total depth 3,747 feet.

Smith County

Graham Brothers' No. 1 Church lot, top sand 3,753 feet, initial production 30 bbls. in one-half hour through open tubing, total depth 3,756 feet.

Sinclair Oil & Gas Co.'s No. 10-A Jarvis, top sand 3,698 feet, initial production 340 bbls. per hour through open tubing, total depth 3,703 feet.

Sun Oil Co.'s No. 9 O. W. Knight, top sand 3,679 feet, initial production 80 bbls. per hour through open tubing, total depth 3,685 feet.

Upshur County

Fleetborn Oil Corp.'s No. 4 Edwards, top sand 3,657 feet, initial production 85 bbls. in one-half hour through open tubing, total depth 3,680 feet.

Galvez Oil Corp.'s No. 2 W. W. Holland, top sand 3,666 feet, initial production 75 bbls. in one-quarter hour through open tubing, total depth 3,677 feet.

Glasscock's No. 1 Missionary Church, top sand 3,753 feet, initial production 60 bbls. per hour through open tubing, total depth 3,759 feet.

Shell Petroleum Corp.'s No. 10 C. C. Landers, top sand 3,657 feet, initial production 12 bbls. in one-half hour through tapered tubing, total depth 3,673 feet.

Sun Oil Co.'s No. 2 A. J. Watkins, top sand 3,693 feet, initial production 70 bbls. per hour through open tubing, total depth 3,702 feet.

Wood and Nelson's No. 1 H. S. Coslett, dry and abandoned, total depth 3,805 feet.

SUMMARY OF STATEMENTS MADE MARCH 10, 1932, RELATING TO BUSINESS OF VARIOUS PIPE LINES FOR MONTH ENDING FEBRUARY 29, 1932

	Gross stocks	Runs from wells	Other receipts	Regular deliveries	Other deliveries
Nat. Transit	714,830.78	126,753.83	1,012,169.98	521,574.03	610,938.07
S. W. Pa. P. L.	404,242.41	58,939.34	645,764.82	393,740.87	357,463.52
Eureka P. L.	1,260,183.19	242,556.95	269,167.31	284,915.43	184,811.27
Buckeye P. L. (Macksburg)	286,436.07	220,174.62	103,133.11	197,422.31	106,549.30
Buckeye P. L. (Lima, etc.)	2,956,771.37	69,769.97	2,175,347.91	1,256,890.69	957,656.63
Buckeye P. L. (Cleveland)	47,411.90	10,650.06	193,741.11	1,468.37	193,179.97
Indiana P. L.	513,552.31	2,432.39	895,779.88	684,053.37	225,363.04
Southern P. L.	241,444.27	.....	89,975.70	29,866.72	73,979.50
Bradford Trans.	283,781.30	358,619.95	.....	252,933.43	.....
N. Y. Transit	195,495.84	42,479.85	118,677.89	164,942.57	.....
Northern P. L.	306,733.15	.....	452,731.24	149,660.95	330,784.93
Tidewater Pipe	863,043.42	23,346.91	.....	373,538.58	.....
Tuscarora Dev.	10,806.70	.....	.....	291,210.02	.....
Total February 29	8,084,732.71	1,155,723.87	5,956,488.95	4,602,217.34	3,040,725.23
Total January 31	8,136,683.84	1,252,896.69	6,918,366.48	5,460,517.61	3,648,835.12
Difference	51,951.13	97,172.82	961,877.53	858,300.27	608,109.89

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Pipe Line Construction News

PIPE QUOTATIONS ASKED ON GAS LINE TO DETROIT

Brokaw, Dixon, Garner & McKee, engineering firm of New York, recently called for quotations on 200 miles of 20-inch pipe, which it is reported is part of the preliminary plans of a 200-mile gas transmission line project that may extend from Muncie, Ind., to Detroit, Mich., to be built by the United Light & Power and the Columbia Gas & Electric interests.

The original line of the Panhandle Eastern ended at Rockville, Ind., but was later joined to the Columbia system through a line constructed from Muncie to Rockville. The Columbia interests also have a line from the Kentucky fields to Muncie, so any line built to Detroit from this juncture could feed from both the Kentucky and Texas Fields.

ATLAS LAYING GRAVITY SYSTEM IN JOINER AREA

DALLAS, Tex., Mar. 14.—The Atlas Pipe Line Co. is building a gravity system in the Joiner area, Rusk County, laying new lines in this system, which connects with the company's major 8-inch carrier. The main line transports East Texas crude to Shreveport, La.

The Sinclair Oil & Gas Co. is laying between 4 and 5 miles of 6⅝-inch casing to serve as a gas carrier from the Peyton Brothers gas well in the southern end of the Joiner area, southern Rusk County, to some of its leases to the north. Gas produced from this well is dry, and will be used by the Sinclair Oil & Gas Co. for drilling and production purposes. The well has a potential of nearly 60,000,000 feet per day and has been shut in for the past two months for lack of an outlet. It was the first dry gas well completed in the entire East Texas district.

The East Texas Refining Co. is connecting its Friars Switch refinery and gathering system in the Joiner area, East Texas, with lines from the Kilgore area, which connect with the company's 12,000-bbl. refinery at Longview. Oil from the Joiner area will be processed in the Longview plant, and it is understood that the Friars Switch plant will be abandoned at least temporarily.

SOCONY'S NEW GASOLINE LINE

NEW YORK, Mar. 14.—Standard Oil Co. of New York, subsidiary of Socony-Vacuum Corp., is now operating its new gasoline pipe line recently completed in New England.

The line, of 6-inch pipe, is about 100 miles long, running from Providence, R. I., to Springfield and Worcester, Mass. Gasoline is pumped into the line from Socony's bulk marine terminal at Providence.

Capacity of the line is approximately 6,000 bbls. per day. The line is operated by a single pumping station, located at Providence.

PROGRESS OF BYRON LINE

CASPER, Wyo., Mar. 12.—Illinois Pipe Line Co. is making good progress on its pipe line from the Byron and Garland structures to Cowley junction on its trunk line from Elk Basin to Greybull. Line will be about 4 miles long 8-inch pipe. When completed it will save the freight charges from Cowley to refinery points by rail, especially to the refinery at Greybull. A pump station has been moved from Bayer on the Salt Creek-Illco line. An 80,000-bbl. steel storage tank is also being moved from Illco and will be erected at the Byron-Garland field station.

QUESTIONNAIRE IS SENT TO PIPE LINE COMPANIES

WASHINGTON, D. C., Mar. 14.—The first questionnaire to be sent out in connection with the investigation which the House Committee on Interstate and Foreign Commerce is making relative to activities and operations of public utilities has recently been addressed to approximately 175 groups operating oil pipe lines.

The questionnaire takes up 10 pages, and inquiries into practically all phases of the operations and activities of the companies involved.

It inquires for data concerning the total number of barrels of oil transported during 1929 to 1931 through gathering lines as well as trunk lines, the number of barrels transported for companies, individuals and "others having no interest, direct or indirect, in respondent," as well as the number of customers served by respondent.

Inquiries are further directed into the total gross operating income received for transportation of oil transported; inquiries into whether or not the respondent owns, controls, or leases interest in storage facilities for oil at points where shipments are received for trunk line movements and whether or not such facilities are, in actual practice, equally open to all who may desire to use them, and whether or not the respondent owns, controls, or leases interest in storage facilities for oil at intermediate and terminal points on trunk-line routes, and if they are open to all who may desire to use them.

The questionnaire asks who owns storage where oil is received in the field, and what rights independent producers or companies have to use these facilities, and asks for an explanation of "deduction of 3 per cent for oil purchased." Another question is: "Under what terms and conditions was pipe line right of way secured?"

Numerous questions relative to the ownership and control of the respondents are contained in the questionnaire.

The basis for the charge for services of the pipe lines also is inquired into by a number of questions under that heading.

NEW COMPANY ORGANIZED TO LAY MINNESOTA LINE

Great Northern Gas & Utilities Co. has been formed, with headquarters in Minneapolis, for bringing natural gas from fields in eastern Montana to metropolitan centers in Minnesota. The 24-inch transmission line would be approximately 500 miles long, and would cost about $20,000,000. It is reported that the company has applied for a 20-year franchise in Minneapolis, and that a new schedule of rates is on file with the franchise application. John Wight of Billings, Mont., is secretary of the new organization.

LINE TO MENDOTA, ILL.

Plans for supplying Mendota, Ill., with natural gas through a branch from the main line of the Natural Gas Pipe Line Co. of America are under way, with construction scheduled to star this month. The line would be 15 miles long, and would leave the main line near LaSalle.

P. G. & E. PIPE LINE BIDS

SAN FRANCISCO, Calif., Mar. 12.—Bids have been received by the Pacific Gas & Electric Co. for pipe for the new natural gas line from Milpitas to San Francisco, but so far the contract has not been let.

PIPE LINE PAPERS AT DISTRIBUTION SESSION

The tentative program has been prepared for the distribution conference under the auspices of the distribution committee, technical section, American Gas Association, to be held Wednesday, April 6, at the Tutwiler Hotel, Birmingham, Ala.

F. A. Lydecker, chairman, of the distribution committee, will open the meeting. The report of the Cast Iron Pipe Standards Committee will be read by C. C. Simpson, Jr., chairman, Consolidated Gas Co., New York.

Afternoon Session, 2 p.m.

The report of the Pipe Joints Committee will be read by H. W. Battin, chairman, United Gas Improvement Co., Philadelphia, Pa., and a paper on Pipe Joint Research at A.G.A. Laboratory, by K. R. Knapp.

A symposium on Welding Procedure for and Physical Characteristics of Arc Welded Pipe Joints, will be led by O. A. Tilton, General Electric Co., Shenectady, N. Y. New Developments, Joint Characteristics and Procedure Specifications for Oxyacetylene Welding of Steel Pipe, will be discussed by T. W. Greene, Linde Air Products Co., New York. Pipe Line Welding, by R. S. Fuller, Pacific Gas & Electric Co., San Francisco; and Copper Pipe for Gas Distribution, by Arthur F. Bridge and Frederick A. Hough, Southern Counties Gas Co., Los Angeles, Calif.

Thursday's evening session will open with a report of the Subcommittee on Conversion from Manufactured to Natural Gas, by George Wehrle, chairman, Public Service Co. of Colorado.

Friday afternoon the report of the Subcommittee on Pipe Coatings and Corrosion Research, will be read by J. K. Crowell, chairman, S. R. Dresser Manufacturing Co., Bradford, Pa., and papers on Accomplishments in Determining Soil Corrosiveness, by Dr. Scott Ewing, research associate, U. S. Bureau of Standards, and Determining the Performance of a Coating Without Disturbing a Gas Line, by R. J. Kuhn, New Orleans Public Service, Inc.

SHELL PETROLEUM BUYS LINE IN GLADEWATER

NEW YORK, Mar. 14.—Shell Petroleum Co. has completed arrangements for the purchase from Magnolia Petroleum Co., subsidiary of Socony-Vacuum Corp., of the Magnolia oil pipe line gathering system in the Gladewater area of East Texas. The gathering system involved in the deal adds more than 50 wells in the Gladewater area to Shell's connections in East Texas.

According to Magnolia officials, the sale was made because the company had found it more advantageous to restrict its gathering operations as much as possible to its own wells, of which it has 221 in the area. In addition, Magnolia is taking oil from some 400 independent wells in East Texas.

FIFTY-MILE LINE IN IOWA

Extension of natural gas from Oskaloosa, Iowa, to Newton, Grinnell and Marshalltown is reported under consideration by the Natural Gas Pipe Line Co. of America. The 50-mile line would leave the main line near Oskaloosa, and extend northwest to Marshalltown, where it would serve the distribution system of the Iowa Railway & Light Corp. The same line would serve Newton and Grinnell, where the distribution systems are operated by the Iowa Southern Utilities Co.

RUMANIAN GASOLINE PIPE LINE BLOCKED

NEW YORK, Mar. 14.—Although the Rumanian Parliament early last year took favorable action on a bill granting to a pipe line company, partly government-owned, permission to build a new gasoline and kerosene pipe line from the refinery center at Baicoi to Constanza, a distance of approximately 300 kilometers, actual construction of the line has been effectively blocked thus far by the opposition of the state railway, which now handles the oil traffic, according to reports from Bucharest. The projected line would have capacity of about 15,000 bbls. per day.

The proposal for the new pipe line involved operation by joint control of the private company and government oil officials, with the line and its equipment reverting to the government after a period of years.

The kerosene pipe line from the Ploesti refinery area to Constanza has been substantially improved recently, the 5-inch pipe at several sections having been replaced with 10-inch line. Installation of a new pumping station at Buzau has increased the line's daily capacity from about 9,500 bbls. daily to about 18,000 bbls. daily.

The Rumanian government is making plans for further expanding the tank car movement of petroleum and refined products to the export port of Constanza through double-tracking the railway system. During 1931, tank car service was increased through the daily movement of 16 trains, instead of 10 as formerly, with an average of 35 tank cars per train.

GAS LINE TO SPOKANE IS AGAIN REPORTED

CASPER, Wyo., Mar. 12.—The Jerome Drumheller interests of Spokane, Wash., it is reported in Great Falls, Mont., have completed plans for a drilling campaign on their holdings in the Cut Bank gas field, northern Montana, to develop adequate natural gas to supply a pipe line to the city of Spokane, Wash. A co-operative movement has also developed among Montana operators headed by J. H. Hamilton, receiver for the Sunburst Oil & Gas Co. interests, which also has for its objective the development of a gas supply for Spokane. Surveys for such lines have already been made. One is through Missoula and Coeur d'Alene, and the other is west from the Cut Bank Field along the Great Northern Railroad and the new transmountain highway.

FIFTY-MILE PANHANDLE LINE

Wellington and Memphis, Tex., have signed a contract with Roy Purdue of Pampa, Tex., representing the Independent Engineering Co., Inc., for a supply of gas for municipal gas distribution systems to be constructed in both towns. An 8-inch line will be constructed from Gray and Carson Counties, Texas, to Wellington and Memphis, a distance of approximately 50 miles. The consumption is estimated at 1,000,000,000 feet per year.

PIPE LINE WALL MAPS

The large wall maps published by The Oil and Gas Journal showing all crude oil, natural gas and gasoline trunk pipe lines in the United States are invaluable to those interested in pipe line development. These maps, measuring 36"x48" show crude oil and gasoline pipe lines on one side and natural gas lines on the reverse side. A limited number are still available at $1 for the set, postpaid.

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Oklahoma City's Allowable Increased

The Field May Produce 105,000 Bbls. in Last Half of Month. Increased Water Intrusion in Lower Simpson and Lime Areas

By W. A. Spinney
Staff Correspondent, Oklahoma Fields

Among the chief developments in Oklahoma during the past week were the rumors of a split between the members of the state corporation commission about the umpire in the Oklahoma City Field and an attempt to change to some one else. Another angle of the situation, is that the state troops will remain at work in the Oklahoma City Field and will not be removed March 15. Lieut. Col. Cicero I. Murray, in charge of the troops in the field, said, that the companies paying the charges desired the additional protection. Some express the opinion that the companies paying the bills do not need the troops' protection, but to prevent the breaking down of proration the companies desire to have soldiers remain.

The State's daily average production shows an increase of approximately 700 bbls. a day for the week ending March 12. The daily average was 419,000 bbls. a day. Oklahoma City Field was active with new wells during the week, adding an additional estimated potential production of 196,000 bbls. The daily average production for the seven days ending March 12, for the Oklahoma City Field was 93,455 bbls., compared to 93,165 bbls. the previous week.

An increase in the Oklahoma City's allowable was granted by the Corporation Commission for the last half of the month. The increase amounted to 3,000 bbls. a day over the previous order, giving the pool an allowable of 105,000 bbls. per day. The new order becomes effective March 16 at 7 a.m. No announcement was made as to changes in percentages or allotment, other than in the lime area, which has been declining fast. The lime zone was reduced to 3,500 bbls. a day from 4,000 bbls. a day. It averaged only 3,715 bbls. a day the first 11 days in March.

The next hearing will be held before the commission March 28, when proration in all other fields in the State will be considered. It is believed that Ray M. Collins, state umpire, will suggest some changes in the operation of the Oklahoma City Pool.

Pipe Line Shipments

The daily average pipe line shipments from the Oklahoma City Field for the first 10 days in March and the new nominations by companies were as follows:

Company—	Shipments	Nominations
Champlin	647	647
Continental	2,196	2,000
Empire	18,164	18,000
Globe	6,543	7,100
Magnolia	6,179	7,500
Oklahoma	17,079	18,000
Operators	2,603	2,603
Prairie	604	604
Shell	11,054	12,000
Sinclair	9,168	9,000
Stanolind	20,808	20,000
Tidal	143	143
Wilcox	1,533	.....
Anderson-Prichard	19	.....
Canadian	143	500
Capitol P. & R.	59	59
Century	1,232	1,500
Peacock	203	203
Petroleum	243	3,500
Salem	1,711	.....
White Oak	194	2,000
Major Petroleum	...	205
Total	100,527	105,609

The status of the Oklahoma City Field according to Umpire Collins' office, shows a total of 675 wells with a potential of 3,237,024 bbls. a day eligible for production during the next period. The estimated stocks on hand March 1 totaled 776,525 bbls. The estimated production for the first 15 days of March was 1,593,648 bbls. and the pipe line shipments for the 15 days were 1,507,950 bbls.

Governor Murray's Choice

The statement was made in state newspapers a few days ago that Governor Murray was desirous of having his cousin, Cicero I. Murray, in the position of state umpire in place of Ray M. Collins, appointed by the Corporation Commission.

Cicero I. Murray was placed in charge of the flush oil fields in the State last August when martial law was declared, holding the rank of lieutenant colonel in the national guard. In the Oklahoma City Field two captains and one lieutenant have been policing the field since the martial rule was partially lifted October 10, 1931.

Colonel Murray is quoted as saying he does not want the position of state umpire, and says he could have stepped into the position last October when the Oklahoma City Field was opened. The offer was made, he says, but he refused it for several reasons. He believes had he accepted there would have been much adverse criticism of Governor Murray because of their relationship. Oil companies have been contributing to pay the cost of maintaining the troops in the Oklahoma City Field and it is believed the payments will stop March 15.

Increased Water Intrusion

According to a survey of the Oklahoma City Field as of March 1, the water wells in the field increased by 12 over the number on February 1. A total of 166 wells were making water on March 1, compared to 154 wells on February 1. A considerable number of wells have made water in the past, but these wells have been plugged back to shallower horizons, or are in the process of being plugged back now. The following table shows the number of wells in the different horizons making water:

Horizon—	Feb. 1	Mar. 1	Increase
Wilcox	5	5	0
Lower Simpson	99	108	9
Lime area	50	53	3
Total	154	166	12

It is believed by many that if a higher allowable production per well is granted in the Oklahoma City Field, the water encroachment will increase proportionately.

Production from the Oklahoma City Field exceeded the pipe line shipments for the first 10 days in March, during which time the daily production also exceeded the allowable fixed by the Corporation Commission. Production averaged 106,242 bbls. with the allowable fixed at 102,000 bbls. Pipe line shipments averaged 100,431 bbls. during the same 10 days.

Underproduction Report

According to the umpire's report as of March 1, the underproduction situation in the Oklahoma City Field, is improving. Crude oil stocks were lowered during the month of February and the pipe line shipments increased. Indications are that only the current underage and stocks will be shipped during the month of March.

As of March 1, the deferred underage totaled 2,950,078 bbls. while the current underage totaled 220,483 bbls. The overproduction on the same date totaled 554,404 bbls. The largest current overproduction is that of the Champlin Refining Co. with 132,098 bbls. A total of 841 wells had a combined potential of 3,374,868 bbls. a day on March 1.

Potential and Actual

The table below gives the names of producing companies, the number of wells of each, the Corporation Commission's estimate of daily potential production, and the actual total production for the month of February (not daily average):

Company—	No. of wells	Potential prod. per day. bbls.	Total prod. in Feb., bbls.
Acme	1	17,255	7,490
Addition	1	19,216	15,872
American	1	13,047	2,635
Anderson & Kerr	1	10,907	2,190
Anderson-Prichard	27	115,672	136,005
Argood	1	96	3,943
Blackstock	1	1,774	292
Blackwell	5	28,357	16,736
British-American	9	86,631	38,312
California	1	313	1,138
Capitol P. & R.	2	19,494	2,367
Capitol Prod., tr.	1	13,052	11,710
Century	5	42,643	35,166
Champlin	10	32,821	8,942
Chatham	2	28,264	12,898
Coline	34	19,147	38,657
Continental	11	67,952	46,959
Courter	1	5,607	3,617
Cromwell-Franklin	32	90,113	89,868
Dabney-Johnson	1	4,260	2,435
Danciger	1	10,279	2,835
Denver	6	54,279	32,370
Denver-Reynolds	1	12,216	16,662
Dengall	4	28,113	35,370
Donleon	2	27,768	8,798
Eason	3	28,499	7,975
Empire	3	16,409	22,258
Franco-Dominion	1	12,506	.....
Wirt Franklin	39	72,895	95,241
Great Southern	1	5,941	1,150
Government	2	9,980	3,222
Hall & Briscoe	1	2,079	2,145
Ed. S. Holman	1	3,352	3,403
I. T. I. O.	293	537,321	540,398
Kedberg	1	474	.....
Kessler	1	3,727	.....
Mabee	4	48,278	36,128
Marshall	3	15,208	4,208
McArthur	2	27,402	5,326
Mid-Kansas	7	5,811	6,307
Minnehoma	1	18,886	8,608
Morgan	3	32,559	13,064
Ocate	2	21,022	12,135
Oils, Inc.	4	32,436	25,362
Paine & Johnson	1	10,853	1,541
Peacock	3	2,981	5,742
Phillips	62	662,021	410,952
Plains	2	10,028	1,630
Prairie	14	7,142	25,688
Rajah	1	14,569	4,480
Reynolds & Unruh	1	8,254	5,087
Refiners Prod.	2	.....	3,587
Russell	2	21,122	19,502
Scott & Co.	2	433	2,938
J. C. Shaffer	6	30,589	19,095
Shell	8	1,487	12,170
Sinclair	54	97,466	54,411
Skelly	23	105,448	43,056
Slick-Urschel	100	493,116	327,393
Springrose	1	13,019	4,064
Stauffer	1	9,919	1,409
Sunray	4	54,366	25,418
Watchorn	1	15,341	.....
Westgate	7	90,310	71,371
Wilcox	10	79,434	17,414
Wrightsmith	2	2,882	4,735
Total	841	3,374,868	2,422,119

Southwest Extension

The southwest edge of the Oklahoma City Field is expected to be developed as soon as possible as the result of the showing of R. A. McArthur's No. 1 Pruitt, in NE cor. NW SE, Section 22-11-3w, which made 330 bbls. in nine minutes before cutting the connections. The well is located about a quarter of a mile west of the nearest production and was at first believed to be on the edge of the Wilcox sand production, but the initial production indicates that the west edge of the field will yield large wells. Practically every lot is under lease in the area, with the Phillips Petroleum Co. the largest leaseholder, and several independents have considerable acreage. Up to the present time the development has been restricted to the eastern edge, mostly in the southeast quarter. Locations have been staked in the southwest quarter.

General Meeting March 22

Ray M. Collins and the committee of five composed of E. F. Guidinger, of

(Continued on Page 51)

WILDCAT OPERATIONS IN OKLAHOMA

NORTHERN OKLAHOMA

ALFALFA COUNTY

Company, farm and location—	Remarks:
Smith Brothers' No. 1 Forbes, SE cor. NW NW Sec. 12-27-11w	S.D. 1,232 ft.
J. W. Bailey's No. 1 Acre, SW cor. NE Sec. 14-24-11w	S.D. 5,502 ft.

BECKHAM COUNTY

Pattel Royalty's No. 1 Goose Tree, SW SE SW SE Sec. 32-10-23w	Rig.
Price-McFann's No. 1 Webster, C SW SW Sec. 34-8-26w	T.D. 2,344 ft.; plugged back to 1,890-1,900 ft.; 1,500,000 ft. gas.
Mid-Continent's No. 1 Schaff, C NE SW Sec. 22-11-22w	Waiting on cmt. to set 430 ft.
Mid-Texas Co.'s No. 1 Sidell, NE cor. SW SW Sec. 17-22-22w	S.D. 2,550 ft.
White et al's No. 1 Green, SW cor. Sec. 34-10-24w	S.D. 3,575 ft.

BLAINE COUNTY

Washoma Oil Co. et al's No. 1 Phillips, C NW SW Sec. 13-19-10w	S.D. 5,115 ft.

CADDO COUNTY

Abernathy & Brown's No. 2 Houston, Sec. 24-6-13w	S.D. 1,115 ft.

CHEROKEE COUNTY

La Piere et al's No. 1 Woods, C SE SE Sec. 27-17-21	S.D. 1,504 ft.

COAL COUNTY

Radial Oil Co.'s No. 1 McGraw, NE NW Sec. 2-1s-8	S.D. 1,450 ft.
Whitney et al's No. 1 Miller, SE NE Sec. 10-2-8	Show wtr. 1,155-60 ft.; S.D.

COMANCHE COUNTY

G. W. Stogner's No. 1 Doebel, C SW SW Sec. 3-3-9w	S.D. 1,450 ft.

CREEK COUNTY

R. F. Moore et al's No. 1 Gilliam, NE cor. SW NW, Sec. 17-17-8	Drlg. 1,005 ft.

CUSTER COUNTY

Miley Pet. Co.'s No. 1 Caldwell, NE Sec. 12-14-14w	Location.

GARFIELD COUNTY

E. L. Love et al's No. 1 White, SE cor. NW Sec. 9-24-6w	S.D. 5,850 ft.
Malarnee et al's No. 1 Phillips, NE SW SE Sec. 24-2-2w	S.D. 4,830 ft.

GREER COUNTY

Dovell et al's No. 1 Capell, NW cor. Sec. 1-7-22w	5,000,000 ft. gas 1,455-65 ft.; T.D. 1,760 ft.
French's No. 1 Murphy, SW NW Sec. 23-7-21w	S.D. 1,645 ft.

HASKELL COUNTY

Ault et al's No. 1 Harrison, CWL SE NE Sec. 14-9-19	Abd. 650 ft.
Ault et al's No. 1 Hall, NW SW SW Sec. 14-9-19	S.D. 2,000 ft.
Ault et al's No. 1 Hall, SE NW Sec. 25-19-9	S.D. 200 ft.
Holden's No. 1 Phillips, SE cor. Sec. 3-9-18e	Abd. 1,860 ft.
Marion Oil's No. 1 Sanders, NW NE NW Sec. 10-9-18e	Abd. 2,387 ft.

KAY COUNTY

Bluebaugh et al's No. 1 Indian, C NW NE Sec. 30-25-1	Drlg. 910 ft.
Harris & Haun's No. 1 Watson, SW NW Sec. 28-28-1w	Drlg. 2,045 ft.
W. H. Atkinson et al's No. 1 Hayes, SE NE Sec. 24-28-3	Abd. 3,308-10 ft; wtr.
Lewis et al's No. 1 Harris, SE NW Sec. 14-25-1	Location.
Mummert Drlg. Co. et al's No. 1 Cormick, C NW SE Sec. 9-27-2	S.D. 3,693 ft.
Blackwell Oil Co.'s No. 1 Harshman, Sec. 2-26-1w	Rig on ground.

KIOWA COUNTY

Christian's No. 1 Jones, NE SE Sec. 8-7-18w	S.D. 852 ft.

(Continued on Page 59)

Potentials Drop in Big Kansas Field

Ritz-Canton-Decker Area Shows Decline of 25,000 Bbls. in a Month. State Credited With Potential of 148,100 Bbls.

By W. A. Spinney
Staff Correspondent, Kansas Fields

The potential production of the Ritz-Canton-Decker Field, the largest flush field in Kansas, is estimated at 25,000 bbls. a day less than it was a month ago. The umpire is taking potential tests in the field, which is in McPherson County, but the work has been delayed by bad weather. The recent storm also delayed field operations in the State. The State's daily average production shows a decline of approximately 2,000 bbls. a day for the week ending March 12. The estimated daily average was 99,400 bbls. a day. Attention is still being focused on the Barton-Ellsworth Arch, in the central western part of the State, where about 30 wells have been completed during the last two years.

L. R. Pickrell, umpire and agent for the Public Service Commission, estimates the potential of the Ritz-Canton-Decker area in McPherson County at 95,000 bbls. a day. The Kansas Public Service Commission ordered the taking of potential tests on all wells in the area to commence February 25, and these are still being taken. On the basis of tests completed at the time this was written, it appears that the Viola lime wells will establish a potential of approximately 80,000 bbls. a day. Of the 51 chat wells, 42 wells have elected to take the minimum allowable in lieu of the production tests and it is estimated that the chat wells yet to be tested, will establish a potential of approximately 12,000 bbls a day, making a potential of approximately 15,000 bbls. daily for all the chat wells, and a total for the field of about 95,000 bbls. daily.

Provided the present pipe line outlet is maintained, the daily allowable will be approximately 10 per cent of the potential production. As soon as the tests are completed the umpire will advise the exact amount of the allowable production. Until that time operators are instructed to produce 10 per cent of the potential production.

The potential production of the Ritz-Canton-Decker Field on February 1 was 120,804 bbls. from a total of 124 wells. The 51 chat producers totaled 42,926 bbls. a day and the 73 Viola lime wells totaled 77,878 bbls.

Harvey-Reno Development

One of the active areas in Kansas is the Burrton district, in eastern Reno County and western Harvey County, near the discovery well, the Shell Petroleum Corp. and Continental Oil Co.'s No. 1 Blake, SE cor. SW, Section 23-23-4w, which was completed in January for 9,000,000 feet of gas a day and 200 bbls. of oil from the Mississippi lime at 3,266-3,378 feet. The area is about 2½ miles south of the Study and Turner gas pool in Section 1-23-4w.

Olson Drilling Co. has arranged to drill three test wells on acreage acquired from the Shell Petroleum Corp. and Cromwell & Lewis plan to drill on acreage acquired from the Prairie Oil & Gas Co.

F. Hollow's No. 1 Church Acre, in Section 20-22-3w, in the northwestern part of Harvey County, was given discovery rights and allowed to produce 175,000 bbls. of oil by the Public Service Commission. It is expected the well soon will have produced that quantity. The oil is being shipped out by trucks. The well may be given a pipe line connection when the allowable has been produced. It is believed to be the only well in the State producing from the Hunton lime.

Mathews & Rex' No. 1 Wilson, SE cor. NW, Section 8-24-12, Greenwood County, extended production about a mile to the south and east, when oil rose 1,500 feet in the hole. The oil was found in the Bartlesville sand at 1,693-1,701 feet with the total depth 1,717 feet. The well is shut down while the operators erect tankage. It is located southeast of the production in Section 6-24-12, and some express the opinion it may connect with this production to the northwest.

Schurr Pool Production

The Schurr Pool, near Raymond, in Rice County, has a daily potential of 11,988 bbls. from 12 wells, according to a report of the field umpire as of March 1. The production in the field is curtailed to 1,833 bbls. a day, the same as it was in February, or 15 per cent of its potential. The total pipe line shipments from the field in February were 53,157 bbls. The field umpire reports the following potential of each well:

Company and well—	Potential	Allowable
Phillips' No. 1 Mezger	1,377	207
Phillips' No. 2 Mezger	1,247	187
Producers' No. 1 Thompson	689	103
Producers' No. 2 Thompson	1,620	243
Slick et al's No. 1 Mezger	886	133
Slick et al's No. 1 Schurr	742	111
Slick et al's No. 2 Schurr	1,062	159
Slick et al's No. 3 Schurr	1,540	231
The Texas Co.'s No. 1 West	998	150
Vickers' No. 1 Binger	1,380	207
Vickers' No. 2 Binger	347	52
Vickers' No. 3 Binger	100	50
Total	11,988	1,833

Another central western Kansas producing well was given an outlet during the week. It was completed more than a year ago and has been shut in because of the lack of a pipe line. The well, Muth Brothers' No. 1 Beyer, in Section 21-19-9w, Rice County, is now pumping a small production daily and the owners are shipping the crude out in trucks to Lyons, where it is transferred to tank cars and shipped to a refinery at Joplin, Mo. The well is located several miles northeast of the Raymond Pool, and is about 5 or 6 miles from the nearest pipe line.

The Vickers Petroleum Co. is planning to erect a skimming plant at Raymond, in Rice County, to handle the company's own production. It has three completed wells in the field with a potential of 1,800 bbls. a day.

In the new extension area of the Voshell Pool, in McPherson County, a new location has been announced, A. W. Schwitelle and others' No. 1 in the SE cor. NE, Section 21-21-3w. The location is a short distance west of the recently completed extension well, the Western Oil Corp.'s No. 1 Wall, Section 21-21-3w, which made 150 bbls. of oil a day from chat.

Smith & Ash's No. 1 in the NE cor., Section 12-17-10w, in the Stratman Pool, in Ellsworth County, is a new location on a lease the owners obtained from The Texas Company. A rig will be moved on the location as soon as the weather permits. It will be the west offset to the Derby Oil Co.'s No. 1 Stratman, in Section 12-17-10w, which is making 30 bbls. of oil an hour on a short production test.

Barton-Ellsworth Potential

A recent check of the wells completed along the Barton-Ellsworth Arch indicates that the estimated potential of these wells is about 30,500 bbls. a day from 30 wells, while the whole State is estimated to have a potential of 148,100 bbls. a day. The wells included in the Barton-Ellsworth Arch are located in Barton, Rice, Ellsworth, Stafford and Rush Counties.

These producing wells are scattered over an area of around 60 miles north and south and about 40 miles east and west. The Schurr Pool, near Raymond, in Rice County, has 11 completed wells with a potential of 11,988 bbls. a day. This pool has the largest number of completed wells and was the discovery field along the arch.

The Stratman area in southwestern Ellsworth County has four completed wells with an estimated potential of 5,250 bbls. a day. There are several locations in the pool which are expected to increase its potential. The Stoltenberg area, in Ellsworth County, has three completed wells with an estimated potential of 2,200 bbls. a day. Gypsy Oil Co. completed the discovery well in this field and has considerable acreage yet to be developed. The Stafford County area, where the Midwest Refining Co. has two completed wells, has a potential of 3,600 bbls. a day.

The Isern Pool, in southeastern Barton County, is estimated to have a potential of 1,000 bbls. a day from two wells. Some express the opinion this may develop into a large producing area, as the Gypsy Oil Co.'s No. 1 Steckel, located about 2½ miles north of the area, is showing for a 700-bbl. well and it may be all one pool when developed.

Other wells include the Heiken area in Ellsworth County with an estimated potential of 1,200 bbls. a day from one well. In the northeastern part of Barton County, the Prairie Oil & Gas Co.'s No. 1 Davidson is estimated to have a potential of 200 bbls. a day. Scattered wells in Rice County are the Sharpe well, located northeast of the Raymond Pool, with a potential of 1,500 bbls. a day; the Beyers well with an estimated potential of 250 bbls. a day, and the Ploog well, in the northern part of Rice County, with an estimated potential of 3,000 bbls. a day.

The most westerly well in the Barton-Ellsworth Arch area is the Dewey & Mitchell No. 1 Greenawalt in Section 17-19-16w, Rush County, with an estimated potential of 150 bbls. a day.

All of these wells found oil production in the Silicious lime, the oil testing from 39 to 40 degrees gravity A.P.I.

A few of the wells in the area are showing water, and it is believed all the wells are connected to pipe lines with the exception of T. H. Tatlock and others' No. 1 Ploog, in Section 33-18-9w, and Muth Brothers' No. 1 Beyers in Section 21-19-9w, both in Rice County.

Chase County

Ryan and others' No. 1 Lipps, C SE SW Section 25-18-6, has spudded and shut down. K.R.&T. Gas Co.'s No. 1 Stevenson, C NE NE Section 27-19-6,

(Continued on Page 51)

WILDCAT OPERATIONS IN KANSAS

(Descriptions are East unless marked otherwise)

Company, farm and location—	Remarks:
BARTON COUNTY	
Morgan & Flynn's No. 1 Haas, NE SW, Sec. 30-18-15w	Location.
Skelton Oil Co.'s No. 1 Ott, C SE SE, Sec. 16-19-14w	S.O. 3,225-28 ft.; 3,304-10 ft. wtr.; fishing 3,375 ft.
BUTLER COUNTY	
Ward McGinnis' No. 1 Bush, SW NE Sec. 10-24-2	T.D. 2,458 ft.; abd.
DICKINSON COUNTY	
Severe et al's No. 1 Lavengood, NE SW Sec. 13-13-2	S.D. 4,752 ft.
ELSWORTH COUNTY	
R. Gear et al's No. 1 Sanberth, C SW SE Sec. 29-16-9w	S.D. 50 ft.
Alyward et al's No. 1 Stratman, SE NW SE, Sec. 1-17-10w	Siliceous 3,255-71 ft.; 117 bbls. 2 hrs shut in; estimated 2,000 bbls.; no pipe line connections.
Aladin Pet.'s No. 1 Stoddenberg, C SW Sec. 22-16-10w	Silicious lime 3,332-47 ft.; estimated 1,500 bbls. a day; shut in.
FINNEY COUNTY	
National Ref. Co.'s No. 1 Wells, C SW Sec. 13-23-30w	Drlg. 3,965 ft.
HARVEY COUNTY	
J. Liggett et al's No. 1 Vessell, NE SW, Sec. 3-23-3w	Location.
Liggett et al's No. 1 Davis, SW SE NE Sec. 7-24-1	S.D. 2,500 ft.
KINGMAN COUNTY	
Skelly Oil Co.'s No. 1 Miles, NE cor. Sec. 30-27-10w	1,635-40 ft., 2,000,000 ft. gas; at 2,005-20 ft., 6,000,000 ft. gas; at 1,133-42 ft., 3,000,000 ft. gas; showing oil 3,385 ft.; T.D. 3,504 504 ft; completed, 260 bbls.
Panhandle Drlg. Co.'s No. 1 Wetheral, C SE NW SW Sec. 20-28-10w	S.D. 890 ft.
McPHERSON COUNTY	
Detrich et al's No. 1 Sinclair, SE SW, Sec. 25-19-1w	Location.
Twin Drlg. Co.'s No. 1 Farver, SW SE Sec. 16-20-1w	Drlg. 3,458 ft; wtr.
Shell Pet. Corp.'s No. 1 Johnson, SE SW SW Sec. 35-19-3w	Top chat 2,984-3,007 ft.; 13,500,000 ft. gas and 600 bbls. oil; shut in.
MORTON COUNTY	
Hydraulic Oil Co.'s No. 1 State Land, NW SE Sec. 22-34-43w	T.D. 3,640 ft.; temp. abnd.
MORRIS COUNTY	
Kostle-Moseley & Hatfield's No. 1 Furney, NE SE Section 16-16-8	Spud; S.D.
Urschel et al's No. 1 Bersuch, NW SE NW Sec. 10-17-7	Fishing 915 ft.
Hankerson et al's No. 1 Cessman, SW SE Sec. 24-16-9	S.D. 2,625 ft.
NORTON COUNTY	
Richards et al's No. 1 Colby, Sec. 17-4-21w	Rig.
OSAGE COUNTY	
Briggs & Smith's No. 1 Wood, SE NW Sec. 21-14-15	S.O. 2,190-2,200 ft.; S.D.
PRATT COUNTY	
Ninnescah O. & G. Co.'s No. 1 Hardesty, SW SE SE, Sec. 28-27-11w	Rig on ground.
RAWLINS COUNTY	
J. G. Durham et al's No. 1 Weaver, SE cor. Sec. 3-2-35w	S.D. 3,925 ft.
RENO COUNTY	
Jarvis & Wright's No. 1 Rainbow, NW SE Sec. 33-22-7w	Rig.
RICE COUNTY	
J. Liggett et al's No. 1 Thodel, C NW NW, Sec. 11-21-7w	S.D. 50 ft.
Gypsy Oil Co.'s No. 1 Steckel, C NE NW, Sec. 31-19-10w	Set 3,299-3,324 ft; S.O.
RUSSELL COUNTY	
J. Brennan's No. 1 Waly, CNL E½ NW Sec. 29-13-11w	Rig.
T. Palmer et al's No. 1 Pasek, C SE Sec. 3-14-11w	H.F.W. 3,340-58 ft.
RUSH COUNTY	
Skelton et al's No. 1 Brock-Hartman, SW SE NE Sec. 4-18-16w	S.D. 50 ft.
SALINE COUNTY	
Twin Mounds Oil Co.'s No. 1 Weis, C W½ NE NW Sec. 20-12-4w	S.D. 2,710 ft.
SHERIDAN COUNTY	
Flo et al's No. 1 Shoemaker, SE SW Sec. 27-7-26w	Drlg. 4,150 ft.
STEVENS COUNTY	
Argus Prod.'s No. 2 Christopher, C NE Sec. 10-33-39w	S.D. 5,521 ft.
SUMNER COUNTY	
Trees Oil Co. and Shell's No. 1 Springate, NE SE SW Sec. 6-34-2	Drlg. by csg. 2,285 ft.
WASHINGTON COUNTY	
Sincox et al's No. 1 Penwell, NW SE NE Sec. 16-3-3	S.D. 1,720 ft.

Good Gasser Completed in Wildcat Area

Louisiana Operators Watching North Sabine Parish Since New Well Blew in. All Completions in District Producers

By J. R. Crumpton
Staff Correspondent, Louisiana-Arkansas

SHREVEPORT, La., Mar. 14. — The attention of operators in this district has been further focused on the wildcat area of North Sabine Parish during the past week by developments in Frank Foster, Inc.'s No. 1 Stevens, Section 20-9-11. The test blew in unexpectedly with an estimated flow of 20,000,000 feet of gas as the crew was coming out of the hole, after cutting a 10-foot core from 3,348-58 feet. All of the drill stem, except six fourbles, was in the hole when the blowout occurred, and the well ran wild for several days before it was killed by pumping in mud with a special high-pressure pump. The Foster well is located on a 4,200-acre block, recently acquired from the Langbridge Oil Co., and is the second successful test for this immediate wildcat area. Last October, the Langbridge Oil Co.'s No. 1 Stevens, Section 17-9-11, three-fourths of a mile northeast of the Foster well, was completed at 3,369 feet, and has been flowing by heads an average of 35 bbls. daily since that time.

Although it is generally conceded that the pay of both wells is coming from the Washita formation, a check reveals that the subsea level of the gas well is 26 feet lower than the oil sand in the Langbridge test. The surface elevation of the latter well is 313 feet and on the Foster test 269 feet, making the subsea depth of the oil sand in the Langbridge at 3,053 feet and of the gas sand in the Foster well at 3,079 feet. Paleontologists state that the Washita in this area is probably made up of a series of sands underlying one another, some of which are dry in different localities, while others carry oil or gas with little or no salt water. The Foster well had a light spray of salt water, but as the hole was open with the exception of 200 feet of surface casing, it has not been determined whether it was coming from the Blossom sand above or from the bottom of the hole. The operators are arranging to pull the remainder of the drill stem from the hole and set casing for a test.

Will Stimulate Drilling

The results obtained from the Foster well and several other tests being drilled in the northern part of Sabine Parish indicate that the northern tier of this parish, including Townships 8, 9 and 10, Ranges 11, 12 and 13, will experience an extensive wildcatting campaign during the next few months. In addition to the shallow sands, recent results of deeper drilling in this area between the Zwolle and Pleasant Hill Fields is very encouraging. R. L. Gay, trustee's No. 1-A Long Bell Lumber Co., Section 10-8-13, has reamed to the bottom at 4,788 feet and is arranging to set casing for a test. This wildcat recently recovered 6 feet of a 14-foot core from 4,774-88 feet from Oolitic limestone of the Glen Rose formation in the upper Trinity horizon. The core had a distinct odor and show of oil, and the indications are that the well has a good chance of making a producer. About 3 miles northwest of the Gay test, J. J. Keen, trustee's No. 1 Belton, Section 31-9-13, has checked high all along the log. The test had a good show of oil at the base of marl from 1,599 to 1,605 feet, tested another good show at 1,713 feet, and had 300 feet of oil in the hole from chalk at 2,037 feet. The present depth of the well is 2,983 feet, and it is reported that the hole will be carried to the Trinity horizon if satisfactory results are obtained from the Gay test.

In Shelby County, East Texas, the Oil News' No. 1 Pickering, G. H. Patterson Survey (formerly carried Harry Elliott and others), failed to flow through tubing and is being swabbed through 8-inch casing. A considerable quantity of oil with salt water has been swabbed from the hole from a total depth of 1,508 feet. The wildcat is located in the eastern part of Shelby County, near the Louisiana line. The only other active tests in Shelby are the Chapparel Oil Co.'s No. 2 Holt, Matthew Moore Survey, and the Western World's No. 1 Foster-Billingsly, Jeremiah Bowlin Survey, northwest of Timpson. The former, the second test in this immediate vicinity, is coring at 3,180 feet. The Western World test (formerly carried as William A. Stephens) has been shut down for several months at 1,640 feet, but the present operators have resumed activities and are drilling at 2,300 feet.

All Completions Producers

Of the seven completions reported in this division, not a dry hole was included, the results of the week's operations resulting in three oil wells and three gas wells with one small wildcat pumper abandoned. The eastern area of the Zwolle Field furnished two of the producers. Baird & Stone's No. 1 McNeely, Section 14-7-11, in the newly opened extreme southeastern extension, was completed flowing 240 bbls. through 2½-inch tubing from 2,493 feet. The well is an offset to the east of Lyons and Neely's No. 1 Clanan, the second well brought in in this area. The Crescent Drilling Co.'s No. 2 Byrd, Section 12-7-11, between the same company's No. 1 Byrd and Smitherman & Grigsby's No. 1 Gardner, both good producers, is pumping 35 bbls. daily from 2,505 feet. In Union County, Arkansas, the Arkansas Oil & Gas Co. completed its No. 1-A Anderson, Section 31-17-15, as a 35-bbl. pumper from 2,190 feet.

Each of three states reported one of the three gas wells completed, but Rankin County, in the Jackson Field of Mississippi, furnished the only one with a high initial flow. Henslee and others' No. 1 Tanner, Section 14-5n-1e, gauged 43,700,000 feet of dry gas, with a rock pressure of around 1,000 pounds, from 2,403 feet. The well is a one-fourth mile extension to the south of the hot spot in the field in Sections 11 and 12. In the southwestern part of Morehouse Parish, North Lousiana, the Southern Carbon Co.'s No. 57 fee, Section 9-20-4e, had an initial flow of 6,500,000 feet of gas and 625 pounds rock pressure from 2,148 feet. The Bethany Field of Panola County, East Texas, furnished a small gasser with the completion of the Natural Gas Production Co.'s No. 3 Mays, Jane Thorpe Survey. The well had an initial flow of only 360,000 feet from 3,360 feet. In the northern part of Bossier Parish, west of the town of Plain Dealing, the Plain Dealing Oil Corp. finally abandoned its No. 1 Nattin in Section 15-22-14. This well, a rank wildcat, was completed last year as a small pumper from 2,890 feet. Due to the present oil situation, the operators of the test have temporarily abandoned activities in that area, but expect to resume operations to further develop that section during this year.

Arkansas More Active

Recent renewed activities in Arkansas indicates that the wildcatters in that State will resume operations which have been shut down for several months. In Hot Springs County, the Star Oil Co. is washing to bottom at 1,300 feet on its No. 1 Cunningham, Section 11-5-16. The test, which is the second hole, the first one being junked at 1,304 feet, has been shut down since August of last year. The wildcat is located on an original block of 8,000 acres, near the town of Malvern. It is reported from Columbia County that the Kendall Oil Co.'s No. 1 Fullenweider-Rhea & Kitchens, Section 13-17-22, which has been shut down at 800 feet for several months, will be taken over by the fee owners and others from Magnolia, Ark. A new test will be started in the vicinity, or the present hole deepened. In Pike County, E. R. Henderson has resumed operations on his No. 1 W. B. East, Section 13-9-23, and is coring at 2,037 feet. Field & Jones are rigging up to drill a wildcat in St. Francis County, in the northeastern part of the State. Their No. 1 F. M. White is located in Section 1-4n-2e. The Drillers Oil & Development Co. has made location for its No. 1 Haynie, Section 1-17-16, Union County. This company has recently temporarily abandoned its No. 1 Pickering, one-half mile south of the new test. The Lion Oil Refining Co. is waiting on better weather and water conditions before resuming operations on its No. 9-A Hayes, a deep test in Section 4-16-15. The test has been shut down for several weeks in rock salt at 7,255 feet.

In the western part of Ouachita Parish, North Louisiana, Wilson & Mitchell's No. 1 Williams, Section 5-16-1e, is reported to have cored 10 inches of heavy oil sand at 2,760 feet. The test is a wildcat, near the Jackson Parish line, and about 20 miles from the Monroe gas field. The Triangle Drilling Co. is making rapid progress on its No. 1 Nuckolls, Section 7-22-12, in the northern part of Bossier Parish, south of the Carterville Field. The latest report has the total depth at 2,218 feet. The area in close proximity to the Zwolle Field in Sabine Parish continues to be the most active spot in North Louisiana. A large number of wells are reaching the pay horizon, and the next week should determine the geographic extent of several recent extensions.

Daily Average Runs

There was a net increase of 500 bbls. daily in the average runs from the fields of North Louisiana and Arkansas during the past week. The daily average runs for the several pools were:

NORTH LOUISIANA

Caddo, light	5,455
Caddo, heavy	2,020
Cotton Valley	575
De Soto and Red River	2,050
Elm Grove	350
Haynesville	4,665
Holly	325
Homer	2,875
Pleasant Hill	330
Sarepta-Carterville	810
Urania	3,020
Zwolle	5,730
Total North Louisiana	28,245
Total previous week	27,905
Increase	340

ARKANSAS

Champagnolle	1,880
El Dorado	2,080
Lisbon	585
Nevada	1,250
Smackover, light	2,880
Smackover, heavy	23,070
Stephens	665
Urbana	860
Total Arkansas	34,180
Total previous week	34,020
Increase	160
Total both States	62,425
Total previous week	62,925
Increase	500

WILDCAT OPERATIONS IN LOUISIANA-ARKANSAS

(Rotary operations unless otherwise designated)

NORTH LOUISIANA

AVOYELLES PARISH

Company, farm and location— Remarks:
Stauffer & Eshleman's No. 1 Caruth, Sec. 40-1n-7e .... Derrick.

BOSSIER PARISH

Andrews & Davlin's No. 1 Nattin, 100 ft. N, 250 ft. W. C, Sec. 15-22-14 .... Abd. 2,890 ft; will not pump.
Dr. W. N. Hankin's No. 1 Newell, 300 ft. S and W, NE cor., Sec. 12-19-11 .... S.D. 1,890 ft.
Triangle Drlg. Co.'s No. 1 Nuckolls, Sec. 7-22-12, 1,985 ft. W, 1,980 ft. S, NE cor. .... Drlg. 2,218 ft.

CADDO PARISH

Calatex O. & G. Co.'s No. 1 W. B. Hudson, Sec. 8-16-16, 2,640 ft. E, 2,865 ft. NW cor., Sec. .... Drlg. 2,725 ft.
Louana O. & G. Co.'s No. 1 Hammock, Sec. 32-19-6, 660 ft. N and W, SE cor. .... S.D. 2,482 ft.

CALDWELL PARISH

Carter Bell's No. 1 Taylor, 150 ft. S, 150 ft. E, NW cor. NE SE, Sec. 17-14-4 .... S.D. 1,100 ft; high wtr.
Hudson et al's No. 1 Burton, Sec. 35-12-2e .... S.D. 2,950 ft.

CATAHOULA PARISH

National Drlg. Co.'s No. 1 Marsh McMiller, 70 ft. N, 100 ft. W, C, Sec. 26-9-6 .... T.A. 3,097 ft.

(Continued on Page 56)

LOUISIANA-ARKANSAS PROVEN AREAS

NORTH LOUISIANA

CADDO PARISH—PINE ISLAND

Company, farm and location— Remarks:
Simplex Oil Co.'s No. 1 Youree-Glassell, 500 ft. N and E, C, Sec. 13-20-15 .... S.D. 2,275 ft.

MOREHOUSE PARISH

Southern Carbon Co.'s No. 57 fee, Sec. 9-20-4e, 660 ft. N, 1,317 ft. E, SW cor. .... Completed 6,500,000 ft. of gas 2,148 ft.

OUACHITA PARISH

Carbon Cons.' No. 7 Guthrie, Sec. 50-20n-4e, 5,263 ft. N, 7,475 ft. W of cors. of Secs. 25, 26 and 49, in Sec. 50 .... Location.

SABINE PARISH—ZWOLLE

L. F. Bahan's No. 1 Quayhagle, Sec. 11-7-11, 250 ft. N, 330 ft. W, SE cor. Sec. .... Set 6-in. 2,455 ft.
Coates Pet. Co.'s No. 2 McNeely, Sec. 14-7-11, 250 ft. S and W, NE cor. NW NE .... Derrick.
Crescent Drlg. Co.'s No. 2 Byrd, Sec. 12-7-11, 330 ft. S and W, NE cor. NW NE .... Completed pumping 35 bbls. 2,505 ft.
Hawkins & Antoon's No. 1 Newton, Sec. 1-7-11 .... W.O.S.R. 2,609 ft.
Hudson & Bird's No. 1 Walden, 480 ft. N, 300 ft. E, SW cor. SW NE, Sec. 26-8-11 .... S.D. 2,454 ft.

(Continued on Page 56)

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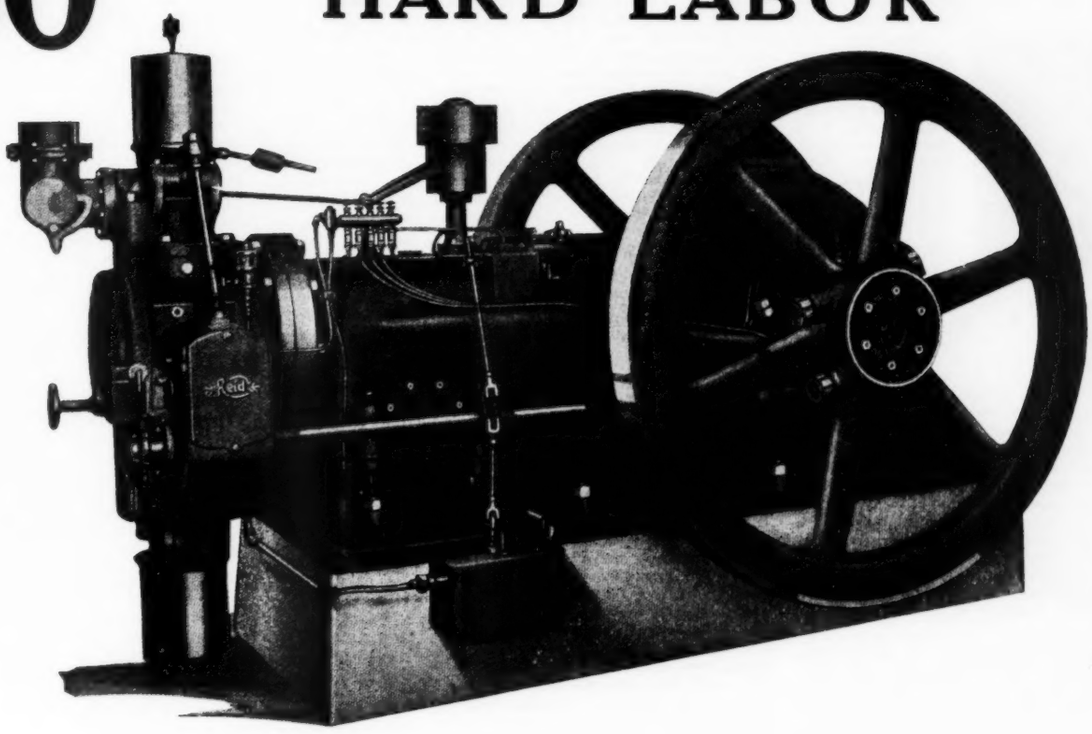

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Storm Ties Up Southwest Texas Work

Wells in Pettus Extension, West End, Stop Flowing. Disappointments in Escobas Pool. Interest in Starr County

By B. D. Stevenson
Staff Correspondent, Southwest Texas Fields

SAN ANTONIO, Tex., Mar. 14.—Severe cold all over Southwest Texas and a blanket of 5 inches of snow in the Laredo territory beginning Sunday, March 6, and extending down through last week slowed up operations more effectually than any proration plan. Early this week as this was being written there were forecasts that the weather would moderate. In the new territory being played in southern Starr County the center of interest is in Heard & Heard's No. 1 Goodrich, carried in drilling reports as R. E. Johnson's No. 1 Goodrich, a mile north of Rio Grande City, and several miles south of the Los Olmos shallow pool. No. 1 Goodrich had 12 feet of well saturated core at 1,480 feet and has set casing, and the program was to bring it in some time last week. This was not carried out and the idea now is to bring it in this week. Production in the shallow pool is at around 400 feet and if this new wildcat near Rio Grande pays off in good shape and in proportion as the Los Olmos shallow pool has done it will undoubtedly result in a scramble for acreage.

During the past week or more while No. 1 Goodrich has been shut down after setting casing, there have been a number of tracts change hands outside of the Heard & Heard block. Nothing in the Heard & Heard block has been sold. Several new operators have gone into the territory within the last week. Bennett Oil & Gas Co., which closed a deal some weeks ago for 1,200 acres in the shallow pool, is moving in a rig to drill the first test and Coastal Oil Co. has made location for its first test in the field.

New Tests in Duval

Four new wildcat tests are to be started or are already starting in northern Duval County, two of them north of the Government Wells Pool and two of them south of it and all of them playing the trend idea that has resulted so successfully in the Laredo district.

Seacord & Putnam have spudded in No. 1 Johnson, 150 feet from the south and west lines of the NW of the NW of Survey 44, 3 miles north of the Government Wells Field, and Suttle and others have started to drill their No. 1 Bennett, 150 feet south and west of the center of the same survey. Both of these are playing the idea of another pool to the north. The Magnolia Petroleum Co. drilled a test in the NW cor of Survey No. 63. The NW cor. of Survey 63 corners on the SE cor. of Survey 44 and the Magnolia test is about the same distance east of the Seacord & Putnam test as the Schlessinger test in Survey No. 76 is east of the discovery well of the Government Wells Pool.

On the south John F. Camp is moving in rig for No. 1 Weill, near the center of Survey 570 and Smith & Capps are to drill in Survey 574 a little northwest of it. These two tests are located about right to pick up a pool south of the Government Wells extension and are located on the same theory as the Seacord & Putnam and Suttle and others on the north.

In addition to these tests it is understood there are other wildcats being planned for northern Duval County, though not on the same trend.

Pettus Field

Wells at the extreme west end of the Pettus extension have stopped flowing. The discovery well in that district was brought in some months ago by Buck Oil Corp. and was its No. 1 Ray. Recently The Texas Company on the Gremmel farm, a north offset to the Buck Oil Corp. lease, brought in a 1,500-bbl. well and other big wells followed. The pressure started going off rapidly and now most if not all the wells, some six in number, have stopped flowing. There is a half mile of territory between this on the west and the Damac discovery well on the east, the Damac well being about a mile west and a little south of production in the townsite pool. Recently Houston Oil Co.'s No. 4 Portis in that district came in dry and Slick-Seeligson got a small gas well so it looks as though production will not extend across from the extension to the townsite. Furthermore, there are two dry holes between the Damac discovery well and the Buck Oil Corp.'s No. 1 Ray, a half mile west, which indicates a break between those two producing spots.

The Pettus area now consists of six separate producing spots and producing from several sand depths.

The Pettus Field and Pettus district for weeks have been holding much of the attention of the industry. At the close of the week nearly everything was cleaned up. Slick-Seeligson's No. 5 Ray, at the west end, looks like not an overly large well and was being completed. Houston Oil Co.'s No. 4 Portis, at the east end, missed the regular pay sand at around 3,900 feet and continued to drill and was down around 4,300 feet but is out of the picture unless it runs into something new.

Balcones Fault Zone

Two new locations were announced the past week in the Balcones Fault zone in southern Guadalupe County, which would be on an extension of the axis of the Darst Creek Field, and 10 to 15 miles southwest of the southwest end of the Darst Creek Field. Another test, the Luling Oil & Gas Co.'s No. 1 Brown, has started to drill southwest of the old Luling Field.

The two tests in southern Guadalupe are the Tidal Oil Co.'s No. 1 Bloch, in the Valentine Bennett Survey, 9 miles south and 3 miles west of Seguin, and the Darst Oil Co.'s No. 1 Hamilton in the J. H. Williamson Survey 8 miles south of Seguin. They will be Edwards lime tests and other wildcats drilled in that district in years past have indicated fault lines and contributed to furnishing geologic information that has helped in making the location for the two new tests.

The Luling Oil & Gas Co.'s test south of Kingsbury and southwest of the Luling Field is equally important. It is on acreage out of a block got together by Pat Armstrong and if it gets production in the Edwards lime should get it at about the same depth as in the Luling Field.

Jim Wells County

Gulf Production Co.'s No. 5 Shaeffer, in northern Jim Wells County, has been turned into the gas line of the Southern Gas Co. It is a wildcat well. There is one other lone gas well about 1½ miles south of it but in a different sand, there being about 500 feet difference in the depth. Gulf finished its test without setting casing, by running tubing with perforated liner at the bottom and packer above the liner. No further drilling has been announced.

Zapata District

Completions in the Zapata district last week were prosaic with the exception of the abandonment of the Brogan & Belcher No. 1 Garza, east of the south end of the Escobas Pool and a few miles south of where K. & M. Oil Co. recently ran into a new sand, and is now trying to complete a well. The Brogan & Belcher test had a showing, but accompanied with salt water, at 1,663-73 feet, which is about the depth of the Fansler gasser brought in two years ago and located in Survey 285 near the K.&M. test just mentioned. The Martinez Field, producing at the same depth, is a mile or more north of the Fansler test and they all line up with the usual trend of the Laredo pools. Brogan & Belcher, failing to get production in the sand at 1,663-73 feet, carried it to 2,006 feet and abandoned it. That part of the district, however, is still in the attention of the industry.

There was another disappointment in the Escobas Pool, S. R. C. Oil Co.'s No. 8-D Montemayor having been abandoned at 1,484 feet. A few weeks ago Daniels & Hill brought in a 1,500-bbl. well at that depth in the SW cor. of Block 7, Survey 64, in sand at 1,484 feet, and located in the south end of the part of the field that is producing at about 1,300 feet. It looked like the opening of something big. The S. R. C. Oil Co. offset it on the south and got a well that flowed 1,500 bbls. in 24 hours and then went to salt water. Same company drilled its No. 7-D Montemayor, a southwest offset to Daniels & Hill, and got a small well in the same sand, and the No. 8-D Montemayor, a west offset to Daniels & Hill's big well, is dry.

Cole Gets Gas Well

Cole Petroleum Co.'s No. 75 Benavides in the Cole gas field came in at 3,012 feet for a big volume of gas but is drilling deeper. The regular sand of that field is at around 1,700 to 1,800 feet and recently Cole Petroleum Co. drilled and completed three or four oil wells in that same sand. The No. 75, two locations north of the nearest oil well, found the sands somewhat different in that horizon and drilled deeper with the result that it has found a new gas sand but is drilling deeper in hopes of finding more oil.

Bruner (Salt Flats) Field

Joe Bruner has resumed drilling his No. 1 Malone at the south end of the Bruner or Salt Flats Field and late in week was in the Georgetown and coring and expecting any minute to top the Edwards lime. Total depth was below 2,717 feet. He had some good showings in the chalk and is in hopes of extending the field.

WILDCAT OPERATIONS IN SOUTHWEST TEXAS

ATASCOSA COUNTY

Company, farm and location—	Remarks:
American Central Oil Co.'s No. 2 Mary McConnell, 150 ft. W of E line, 300 ft. S of No. 1, Blk. 138, W. C. M. Baker Sur., 3 miles W and 6 mile S from Somerset	T.D. 1,665 ft.; drlg.
Glen Mathis' No. 2 Mrs. C. Martin, 100 ft. SE of No. 1	T.D. 2,980 ft.; preparing to resume.

BLANCO COUNTY

Hardy-Sitton's No. 1 McMillan	T.D. 602 ft.; S.D.
Theo. Hick's No. 1 Specht, 1,500 ft. from S line, 500 ft. from W line of farm, in Thomas M. Fowler Sur. No. 27 in extreme south point of county	T.D. 1,650 ft.; S. D.
Liles Adams et al's No. 1 Luders, 150 ft. to S line, 1,420 ft. to E line of James Stanford's No. 155	T.D. 1,100 ft.; standing.

BASTROP COUNTY

E. R. Marts and W. J. Beavens' No. 1 R. L. Carter, 450 ft. from NE line, 150 ft. from NW line of 100-ac. tract in George J. Glasscock Sur.	Spudded in.
E. R. Mart's No. 2 Wm. Bahn, 2,000 ft. from E line, 1,300 ft. from S line of farm in James Sandifer Sur.	T.D. 1,604 ft.; abnd.
Sun Oil Co.-Humble Oil & Ref. Co.'s No. 1 Powers, 400 ft. of N and E lines of Blk. 197, Bastrop town tracts.	T.D. 3,900 ft.; drlg.

BEE COUNTY

Alexander et al's No. 1 McFall, 3 miles S Skidmore	T.D. 2,100 ft.; standing.
Humble O. & R. Co.'s No. 1 Laura Thompson, 6,360 ft. from N line, 15,100 ft. from W line of tract in Garrett Roache Sur., S part of county	T.D. 5,310 ft.; S.D.

BELL COUNTY

Bridwell et al's No. 1 Nichols, 150 ft. to W and N lines of farm, N. Roberts Sur.	T.D. 425 ft.

(Continued on Page 71)

SOUTHWEST TEXAS PROVEN AREAS

PETTUS POOL—BEE COUNTY

Company, farm and location—	Remarks:
Buck Oil Corp.'s No. 3 Ray, 175 ft. from W line, 150 ft. from N line of lease in John Williamson Sur.	T.D. 3,905 ft.; comp. 200 bbls.
Houston Oil Co.'s No. 4 Portis, 310 ft. E of No. 3 Portis in A. Smaller Sur.	T.D. 4,215 ft.; coring.
J. L. Mauldin's No. 2 fee	Rigging up in SW cor. of lease.
Slick-Seeligson, Inc.'s No. 5 Ray, 300 ft. E of No. 3 Ray in George A. Kerr Sur.	T.D. 3,886 ft.; set csg.

COOKSEY POOL—BEXAR COUNTY

Chiquita Oil Co.'s No. 3 Cooksey, 480 ft. from E line, 330 ft. from S line of tract in J. W. Rialls Sur.	Location.
Chiquita Oil Co.'s No. 1 Piniazek, 690 ft. from N line, 160 ft. from E line of tract in Martinez & Arocha Sur.	T.D. 1,669 ft.; going on pump.
Chiquita Oil Co.'s No. 1 Dan Kosub	T.D. 1,579 ft.; set csg.

ECKERT POOL—BEXAR COUNTY

Alamo Nat. Gas Co.'s No. 4 Gembler in Manachaca Sur. No. 51	Location.
F. H. Eckert & Son's No. 9 Sandemer, 150 ft. to N and W lines	Location.
F. H. Eckert & Son's No. 10 Sandemer, 400 ft. E of No. 9.	Location.
F. H. Eckert & Son's No. 1 Louis Brehm, W offset to No. 3 John J. Brehm	Location.
W. R. Swearingen's No. 8 Halbadier in Perez Sur.	Moving in.

SALT FLATS POOL—CALDWELL COUNTY

Joe Bruner's No. 1 Malone, 150 ft. to N line, 750 ft. to W line of tract, A. Floyd Sur.	T.D. 2,717 ft.; coring.
John Storey's No. 1 Dickerson, 150 ft. to N of center of S line of tract, John R. Rains Sur.	Rigging up.

(Continued on Page 70)

Rabbs Ridge Interest in Negotiations

Montgomery County Continues in Spotlight. Second Producer at Manvel. To Resume Operations at Mykawa. More Activity Reported

By Neil Williams
Staff Correspondent, Gulf Coast Fields

HOUSTON, Tex., Mar. 14.—A reported transaction involving the sale of Cullen & West's half interest in the Rabbs Ridge Field, Fort Bend County, to Humble Oil & Refining Co. was creating considerable comment in Gulf Coast oil circles at the close of the week. However, although general information received from outside sources was to the effect that the deal was closed as of March 11, statements from the parties affected indicated the sale had not been completed but that negotiations were still under way.

If consummated, the trade will be one of the largest on the Gulf Coast in several years. While terms have not been made known they are believed to be on the basis of a $3,000,000 cash payment with an oil consideration of around $17,000,000. The property consists of a half interest in approximately 4,000 acres in the Rabbs Ridge (Thompson or Clear Lake) district of eastern Fort Bend County, and on which there is a present production of better than 8,000 bbls.

Gulf Production Co. holds the other half interest in the property. The latter company also owns some additional acreage of its own, which is not affected in the reported deal. The jointly owned acreage is being developed by Cullen & West, and on completion of a trade, Humble Oil & Refining Co. probably will assume the development.

Rabbs Ridge, which name has been designated recently for official use, is a geophysical salt dome prospect located in the J. Rabb, Robert Peebles and Samuel Kennedy Surveys, in the extreme eastern part of Fort Bend County. As yet no cap rock or salt to identify the dome has been encountered. The field was opened for production in June, 1931, by Cullen & West, who completed a 300-bbl. well in a Miocene sand at 3,087 feet. This sand, however, has not turned out of any importance, and with the exception of three wells, approximately 2,500 feet to the southwest of the discovery well, completed in a 3,500-foot horizon, development since has been in a 5,200-foot Oligocene sand, in which seven good wells, two drilled by Gulf Production Co., have been completed. The limits of the field have not been proved in any direction and except for several tests which have been abandoned following gas blowouts while drilling to the 5,200-foot sand, there have been no dry holes. Present production extends over 1¼ miles from north to south.

Outlet for the field is provided by the Gulf Pipe Line Co., which laid a line following the discovery of the field to a connection with the company's Orchard-Pierce Junction line. Because of pipe line limitations, Gulf has restricted its runs from the field to a maximum of 9,000 bbls. daily although the field has produced better than 12,000 bbls. At present Cullen & West and Gulf Production Co. each have one rig running although the former operators are rigging up for another test and have made location for a third.

Montgomery County

So far, no verification has been given by the prinicpals of the completion of a reported trade involving a purchase by Humble Oil & Refining Co. of Strake Oil Corp.'s wildcat producer, No. 1 South Texas Development, in the Theodore Slade Survey, southeast of Conroe, Montgomery County. This deal, according to unverified reports, as carried in the March 10 issue of The Oil and Gas Journal, also will include a block of between 4,300 and 4,500 acres, comprising the South Texas Development Co. acreage in the Strake 8,000-acre block.

Of particular interest in Montgomery County was the reported leasing by Cullen & West of approximately 1,500 acres located southeast of the Strake block and about 6 miles southeast of Conroe. Scattered leasing continued to be done throughout the area although for the most part the general situation is marking time pending outcome of the reported Strake deal and also developments in the Heep Oil Co.'s wildcat, No. 1 Cartright, a little over a mile to the northeast of the Strake producer, and which is reported down below 3,800 feet.

Manvel Producer

Of chief importance in field developments during the week was the completion by The Texas Company of its No. 2 Belcher, the second producer at Manvel, northern Brazoria County. This well, some 1,800 feet east and south of the discovery well, No. 1 Belcher, set 56 feet of 7-inch screen and 75 feet of blank in sand at a total depth of 5,602 feet, coming in March 9 through 3-inch tubing making gas with a spray of oil. The fluid has since increased slightly and at latest report was flowing between 80 and 90 bbls. net oil with an estimated 5,000,000 feet of gas through a quarter inch choke, having a pressure of 1,760 pounds on tubing and 1,600 pounds on casing. There has been no water but the oil is cutting 6.5 per cent base sediment.

Although this well is a little lower than the discovery well and so far has not made nearly as good a showing for production, it is possible with decline of pressure that the flow will be increased materially. Bottom of the hole of the first well is 5,494 feet where it was completed for 600 bbls. daily. That well had been deepened from 5,481 feet, where it came in for 2,000 bbls. High gas pressures have handicapped both wells.

Pierce Junction

Gulf Production Co. brought in its No. 9 Cain, located in semideveloped territory on the extreme east flank of Pierce Junction, flowing 500 bbls. daily, 400 pounds pressure, through a quarter inch choke from sand at a total depth of 4,005 feet. Humble Oil & Refining Co.'s No. 1 Hooks, south flank of Pierce Junction, plugged back from cap at 4,255 feet to 3,956 feet, where screen was set, tested salt water. The well, a semiwildcat, was completed last January in sand at 3,894 feet for 600 bbls. but failed to hold up and was deepened. Rio Bravo Oil Co.'s No. 21-A Settegast, west flank, a workover, set 24 feet of screen at 4,313 feet and came in flowing by heads but now is being rigged up to pump. The same company's No. 23-A Settegast, same area, is testing sandy shale showing oil at a total depth of 4,161 feet.

Markham Extension

United North & South Oil Co.'s No. 1 McDonald, an extension test on the northeast flank of Markham, was swabbed in, flowing by heads in sand at 3,581 feet but because of the small showing is being deepened. Two other wells in the same area but a little closer in to the dome are producing in the same sand around 3,300 feet. One of the latter, Ellis Hamill's No. 1 Meyers, the discovery well of the flank sand, has been flowing steadily since last July, proving an exceptionally consistent producer not only for Markham but the Gulf Coast generally. On the south side of Markham, L. P. Smith and associates have started drilling in their second hole to test flank sand production there. This well, No. 2 Hudson, is drilling around 700 feet. The first was abandoned two weeks ago in heaving shale at 3,700 feet.

Southeast of Jennings

Yount Lee Oil Co.'s No. 10 Housierre-Latrielle, southeast of Jennings, Acadia Parish, so far is not a producer in the deep sand at a total depth of 8,678 feet which it is testing. One joint of screen was set and the hole bailed dry. Since, the fluid has risen 500 feet in the hole and bailing is being continued. If this had made a well it would have established a new deep production record for the Gulf Coast, exceeding that set by the same company's No. 7 Houssierre-Latrielle, located in the same immediate vicinity, and which made a well at 7,447 feet.

Start at Mykawa

F. R. Flanigan and associates of Fort Worth, who recently completed a deal with H. C. Cockburn for the development of Mykawa, a torsion balance prospect south of Houston, is preparing to start up operations, first to work over a well, No. 3 Minnetex, drilled by Humble Oil & Refining Co. The latter company several months ago gave up its holdings at Mykawa after the drilling of nine tests, three of which made small producers, although only one at present is producing. No. 3 Minnetex was completed in September, 1930, in sand at 4,826-73 feet flowing 710 bbls. in the first day but failed to hold up at that figure. Two tests, in addition to those by Humble, have been drilled by other operators.

Harris County

The Flanigan interests also recently made arrangements to develop the Genoa prospect, Harris County, and which also was turned back to H. C. Cockburn by Humble Oil & Refining Co. after the drilling of two tests. These tests also encountered showings and one was completed as a small gas well before being deepened and abandoned.

Moss Bluff Dome

A shallow sand or cap rock test on top the Moss Bluff Dome, has been started by Humble Oil & Refining Co. in No. 9 Sterling, which at latest report was down 1,201 feet. Location of this test is 300 feet west and up on the dome from No. 1 Sterling, which was abandoned in salt at 2,012-24 feet.

Matagorda Wildcat

United North & South Oil Co.'s No. 1 Stoddard, a deep rank wildcat in the J. C. Keller Survey at the corner of the Buckeye Townsite, Matagorda, and which is being watched closely because of its depth, late in the week was coring deeper in sand below 7,890 feet. The test had a slight show of oil in the sand topped at 7,843 feet.

The week was marked by a considerable amount of new activity starting up in scattered areas and fields over the Gulf Coast with indications that active development will be carried on in several districts where work has been virtually suspended for several months. Quite a bit of work is being undertaken at Refugio, lower coastal country, in working over deep producers, which have quit flowing or have shown water. Within the past several weeks, operators there have gone back in 10 old wells with a view to deepening some to lower horizons and plugging back the deeper wells to shut off the water.

GULF COAST FIELDS AND WILDCATS

Week Ending March 12

BARBERS HILL—CHAMBERS COUNTY

Company, farm and location—	Remarks—
Bashara Oil Co.'s No. 2 Tarbutton, Henry Griffith League, 25 ft. W of Texas Gulf Producing Co.'s No. 2 Tarbutton	Drlg. hard shale 3,502 ft.
R. E. Ferrell's No. 2 Wilburn, Henry Griffith League, 215 ft. W of No. 1 in center of 45-acre tract	Waiting cement to set 1,870 ft.
Gulf Prod. Co.'s No. 7 Wilburn, Henry Griffith League, 177 ft. W of No. 6	T.D. 3,478 ft.; plugged to 1,185 ft.; drlg. salt 2,723 ft.
McAlbert Oil Co.'s No. 5 Wilburn, Henry Griffith League, 375 ft. of No. 4	Drlg. shale and lime 3,375 ft.
Mills Bennett Prod. Co.'s No. 1-B Gulf fee, Wm. Bloodgood Sur., 500 ft. E and 50 ft. N of SW cor. of "B" lease	Drlg. hard sand rock 1,207 ft.
Mills Bennett Prod. Co.'s No. 2 J. C. Means, Henry Griffith Sur., 300 ft. W of No. 2 in center of strip	Rigging up.
Sun Oil Co.'s No. 14 J. Wilburn, Henry Hodges Sur., 150 ft. W of No. 12 and 50 ft. from N line	Derrick.
The Texas Company's No. 6 Wilburn (D.D.), Henry Griffith League	Sand and shale showing oil 4,910 ft.; cmtd. 7-in. csg. 4,868 ft.
The Texas Company's No. 7 Wilburn (D.D.), Henry Griffith League	Cleaning hole to work over 4,422 ft.
The Texas Company's No. 8 Wilburn, Henry Griffith League, 25 ft. W of No. 5 and 50 ft. N of S line of tract	Sand and shale showing oil 4,392 ft.; cmtd. 9⅝-in. csg. 4,370 ft.
Texas Gulf Producing Co.'s No. 1 Scott, Fitzgerald, 125 ft. from S line and 71 ft. from E line of Strip No. 1, Henry Griffith League	Drlg. hard sandy lime 4,268 ft.
Texas Gulf Producing Co.'s No. 9-B Kirby, Henry Griffith League, 50 ft. out of SW cor. of J. M. Fitzgerald 50-acre tract and 110 ft. S of N line of Kirby tract	T.D. in salt 2,379 ft.; plugged to 1,700 ft.; drlg. cement and salt 2,070 ft.
Texas Gulf Producing Co.'s No. 7-A Barber, Henry Griffith League, 712 ft. from W line and 225 ft. from N line of tract	Drlg. gumbo 1,626 ft.

HUMBLE—HARRIS COUNTY

J. E. Burt et al's No. 1 C.O.&G. Texas Co. fee (D.D.), J. B. Stevenson Sur.	Set 320 ft. of 4¾-in. screen 2,282 ft.; bailing.
J. E. Burt et al's No. 2 C.O.&G.-The Texas Co. fee, J. B. Stevenson Sur., 450 ft. N of No. 1	Location.
Sun Oil Co.'s No. 27 Bender, W. B. Adams Sur., 250 ft. W of No. 26 in line with No. 25	Drlg. shale and rock 4,142 ft.
Sun Oil Co.'s No. 50 River, Robert Dunman Sur., 102½ ft. from W line of W.&?, Blk. 25, due W offset E. M. Wilson's No. 8 W.&P.	Drlg. shale and lime 1,070 ft.

PORT NECHES—ORANGE COUNTY

The Texas Company's No. 3 Polk, T. J. Notgrass Sur., 500 ft. NE of No. 2 Polk	Drlg. gumbo 1,875 ft.

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XUM

Hobbs Operators Get Counter Proposal

Governor Seligman Submits Proration Agreement Which Provides That State Geologist May Withdraw on Six Months' Notice

By Tolbert R. Ingram
Staff Correspondent, Rocky Mountain Area

DENVER, Colo., Mar. 14.—Gov. Arthur Seligman of New Mexico has submitted to the Hobbs Pool operators a counter proration proposal with a provision that the state geologist, on behalf of the State, may withdraw from the agreement at the end of six months upon giving written notice. Hobbs Pool allowable outlet for the first half of March was placed at 31,328 bbls. daily, practically the same as was in effect last month. The Continental Oil Co.'s No. 6-B State, in the Hobbs Pool, proved to be one of the biggest wells so far completed in the southeastern end and was given a potential of 22,939 bbls. The Midwest Refining Co.'s No. 8 Byers failed to flow open, but was given a potential of 2,207 bbls. on a proration test through tubing. One new location was made in the Hobbs Pool. Flynn, Welch & Yates completed a 35-bbl. well in the Artesia area in Eddy County.

In Colorado the MacDeb Drilling Co.'s No. 1 Fitzsimmons, near Denver, reports another show of oil at 5,942 feet. One new location was made in the Greasewood area. There were no completions.

Wyoming had an important completion on the Frannie Dome in the Midwest Refining Co.'s No. 4 Rosenberg, 530 feet down structure, and rated at 700 to 800 bbls. One location was reported in the Badger Basin Field.

Montana had no completions. One new location was made by the Ohio Oil Co. in the Dry Creek Field.

NEW MEXICO

The counterproposal for a proration agreement submitted by Gov. Arthur Seligman to E. G. Allen, chairman of the Hobbs Pool Executive Committee, will be taken under consideration by the operators. Last January the operators and James F. Hinkle, commissioner of the New Mexico land office, signed an agreement, effective January 10, extending proration for one year, with the privilege of withdrawal at the end of six months. Governor Seligman withheld his approval and proration has continued under the old agreement. There is a difference of opinion as to whether the land commissioner or the state geologist is the proper person to sign on behalf of the State. The governor has held that Dr. E. H. Wells, state geologist, is the proper official, while Commissioner Hinkle took the position that he had the authority.

The governor's proposal, otherwise the same as the original agreement and the memorandum of extension, authorizes the state geologist to withdraw his approval of the agreement in the same manner as the oil operators are permitted to withdraw their participation. This provision permits any party to withdraw upon 30 days' notice after six months, such withdrawal to act as a dissolution of the agreement. The governor's proposal makes no reference to the original agreement, but provides for the new one becoming effective as of January 10, 1932. Both proposals permit the storage of oil, but makes no agreement as to maximum or minimum production.

The proration schedule for the first half of March places the daily allowable for Hobbs at 31,328 bbls., against 31,383 bbls. for the last half of February. Recent completions bring the total number of wells up to 152 on 133 units, an increase of two in wells and units. The potential as of March 1 was placed at 1,168,515 bbls. daily as against 1,126,612 on February 15. Pipe line runs in February were 899,909 bbls., bringing the total for the field since proration went into effect up to 20,303,679 bbls.

Lea County

The Continental Oil Co.'s No. 6-B State, C SE SW Section 33-18-38, in the southeastern part of the Hobbs Pool, which was reported a completion last week, was given a potential of 22,939 bbls. of oil and 22,289,000 feet of gas, open flow, in an official gauging for proration. Through the tubing, it gauged at the rate of 8,901 bbls. and 7,034,000 feet of gas. It is an offset on the west to the Midwest Refining Co.'s No. 29 Turner, completed a year ago and given a potential of 21,352 bbls. These are the two best wells so far completed in the southeastern part of the pool. The new well cut only one-half of 1 per cent water and basic sediment.

The Midwest Refining Co.'s No. 8 Byers, C NW NW Section 3-19-38, an offset on the south to its No. 29 Turner, which was reported a completion waiting for proration test last week, failed to flow when gauged open, but through the tubing it produced at the rate of 2,207 bbls. of oil and 2,024,000 feet of gas. The corrected total depth is 4,178 feet and the tubing is at 4,159 feet. This is an outside well on the southeastern edge of the field.

The Midwest has made a location for its No. 29 State, C SW SW Section 10-19-38, and is digging cellar and pits. It is located between producers.

The Midwest's No. 8 Turner, C NW SW Section 34-18-38, a north offset to its No. 29 Turner, is drilling at 2,215 feet in anhydrite and salt. It topped the anhydrite at 1,606 feet and the salt at 1,738 feet.

The California Co.'s No. 1 Meredith, SE cor. NE Section 19-21-36, Eunice Pool, which was deepened to 4,000 feet and plugged back to 3,950 feet, showed a good water shutoff in a two hours' test. It is preparing to cement the 5⅜-inch at 3,870 feet.

Eddy County

Flynn, Welch & Yates' No. 61 State, SE NE NW Section 32-18-28, southeast of the Artesia Pool, where a number of dry holes have been drilled, made 90 bbls. the first 24 hours and 40 bbls. in the second period. It is expected to settle to 35 bbls. and is a completion. The pay was at 1,988-2,012 feet and total depth 2,039 feet. It was shot with 90 quarts.

Flynn, Welch & Yates' No. 1 State (Paul), NE cor. SE Section 26-20-27, South Artesia area, to the southwest of the Getty Pool, is moving in fuel oil and machine for their No. 61 State.

R. D. Compton's No. 1 Compton, NE NW NE Section 8-18-27, southwest of the Compton Pool, is bottomed at 1,236 feet in lime and waiting for tubing after pulling the 10-inch. It had a show of oil in the shallow sand at 1,230-36 feet and was filled with 300 feet of water until the tubing arrives.

The Grayburg Oil Co.'s No. 3 Burch, C SW NW Section 19-17-30, Jackson Pool, is drilling at 1,203 feet in anhydrite and gray shale. The bottom of the salt was at 865 feet.

San Juan County

The Continental Oil Co.'s No. 24, SW NW SW Section 1-29-19, Rattlesnake Dome, has reached its objective in the Pennsylvanian and cored to 6,975 feet. It is running a sand tester. The oil in the discovery well in that horizon was found 30 feet below a water sand.

De Baca County

The Matador Oil Co.'s No. 1 Woods, NE SW SW Section 6-4n-20, Salada Creek, is shut down at 3,500 feet in red sand waiting for orders.

Bernalillo County

The Norins Realty Co.'s No. 1 Pajarito grant, NW cor. NE Section 22-9n-1e, is drilling below 1,243 feet and carrying the 12½-inch.

Rio Arriba County

The Governardo Dome Oil Co.'s No. 1, NW NE NE Section 15-29-7w, is drilling at 2,005 feet and carrying the 5⅜-inch.

COLORADO

Arapahoe County

The MacDeb Drilling Co.'s No. 1 Fitzsimmons, C S half NE Section 7-4s-66, near Aurora, which has had several shows of oil in different horizons above its present total depth of 5,942 feet, again reports a substantial show at the bottom. The 4¾-inch was landed at 5,920 feet in hard rock two weeks ago. On account of deviations from vertical resulting from sidetracking operations, it was necessary to have a special 3-inch drill stem made to go through the pipe. When drilling was resumed, the 3-inch bit went through the hard rock and encountered a change in formation. After cutting 8 feet of dark brown slate it penetrated 14 feet of broken formation consisting of sand, lime and sandy shale. These were in thin streaks, the thickest being about 2 feet of lime. After going through the hard rock, a sample was washed and yielded some rainbows. The next morning the results were about the same. Then the bit was sent 5 feet below the slate and came out smeared with oil. The bailer was run and about 1 gallon of oil was on top of the muck. It was then bailed down and 1 to 2 gallons of oil showed each time the bailer was run. It then was deepened 3 feet with no particular change in the results. Operations then were suspended after putting 300 feet of water in the hole until a master gate can be installed.

It is planned to underream and lower the 4¾-inch 15 feet before going any deeper. The temperature at the bottom of the hole is approximately 175° F. and not quite as hot as the wells at Greasewood. No attempt has been made to identify the horizon. W. N. McPhee, who is in charge of the drilling, says it may be the Muddy, although he is inclined to identify it as the third member of the Wall Creek series, as the sands in the Frontier are known in Wyoming. This well was started early in 1926 and has been in the limelight a number of times. A. J. Finch, president of the company, recently quoted a prominent geologist as saying that the hole (then at 5,875 feet) was close to the Muddy. This was based on a reading of the log which put the top of the Pierre at 1,205 feet and the bottom at 4,017 feet where a 12-foot limestone break was encountered. This break may be the Timpas lime.

Greasewood Area

The Platte Valley Petroleum Co. has made a location in the C NW SW Section 29-6n-60, on the Edith Campbell tract, in Morgan County, nearly 2 miles to the southeast of the Continental Oil Co.'s No. 1 Gadbois. Cellar and pits are being dug and a rig will be moved in. This operation is reported to be for the purpose of validating the lease pending the signing of agreements for the development of the company's acreage and may be taken over by some other interests for completion on a percentage basis.

A hearing is scheduled for the last part

(Continued on Page 64)

LIGHT CRUDE OIL PRODUCTION AT 6,150 FEET TURNER VALLEY

By Victor Lauriston
Staff Correspondent, Canadian Fields

CHATHAM, Ontario, Mar. 12.—In the Mercury tract, South Turner Valley, Miracle Oils' No. 3, LSD 11, Section 4-19-2w5, has encountered a new development in the shape of a small but definite production of light crude oil at a depth approximating 500 feet in the Madison lime. Production was encountered at an aggregate depth of 6,150 feet, and the showing, which tests 50 to 52 gravity, is yielding about 15 bbls. a day. Miracle's No. 3 is located in the same general area as Hylo's No. 1, which got a strong flow of light crude in the Home sands, and Mercury Oils' No. 1, which was an exceptionally large crude naphtha producer in the Madison. The Miracle test got no light crude showings whatever in the upper horizons and after getting the Madison lime at a reported depth of 5,480 feet it has been drilling in that horizon. Tests were made at several points in the lime without securing either crude naphtha or wet gas. On cleaning out recently for a test at 6,150 feet, some 570 feet in the lime, the test showed indications of crude oil and water. The water was apparently from the drilling mud, since a later test after allowing the well to stand showed considerable gas accumulation and clear crude oil.

The crude is similar to the earlier shows of light crude encountered in the upper sands of the Turner Valley Field. The only previous record of crude oil in the lime in the Turner Valley Field is in Model Oils' No. 1, in North Turner Valley. The latter, however, started as a crude naphtha producer, though with less than usual wet gas, and the product, though rated as crude oil, is condensed from a small flow of very wet gas and closely approximates naphtha. In Miracle's No. 3, which is at the opposite end of the field, the crude is apparently separate from the gas. Outside the Turner Valley, crude has been found in the Madison lime in three successive deep tests in the Lethbridge area, Parco Oil Co.'s No. 1, Hudson's Bay Oil & Gas Co.'s No. 1 and Texas-Imperial's No. 1; but in all these tests the crude was in the top of the lime just below the Ellis-Madison contact and tested around 30° to 35° Be. Miracle's No. 1 is continuing testing in the hope of increasing production and the test may be drilled deeper or a shot may be tried.

Deeper Drilling

A number of operators have claimed that deeper drilling in the lime would develop crude oil, on the theory that the naphtha-bearing wet gas had filtered from a lower reservoir. Miracle's No. 3 is the first test to show any corroboration of this popular theory. A number of

(Continued on Page 28)

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REPRESENTATIVES IN ALL PRINCIPAL FIELDS

OGJ-3-17-Gray

Standstill Prevails on Pacific Coast

Until Prospective Legislation Affecting Oil Business Is Out of the Way Little Change in Prices Seems Likely

By L. P. Stockman
Staff Correspondent, California Fields

LOS ANGELES, Calif., Mar. 14.—Conditions on the Pacific Coast are unchanged and it appears probable that crude and refined oil prices will remain at their present levels for another 60 days. Under normal conditions a strengthening of prices would be expected before the summer season sets in, but at present there is nothing to indicate an early revision, especially as uncertain factors may have a decided effect on subsequent production. The Sharkey bill, subject of a special election May 3, and the State's attempt to enforce the gas conservation law at Santa Fe Springs on May 9, may change the status of the oil industry on the Pacific Coast. The only likelihood of an early change in prices previous to this legislation is a possible increase in the third-grade gasoline. Both independent refiners and major companies would welcome an opportunity to put on an additional 2 or 3 cents per gallon. The chief obstacle is the inability of marketers to effect a uniform increase in the price structure at the same time.

Crude oil production in California, which has been hovering around the 500,000-bbl. mark for several months, has been unusually stable during the past few weeks. Last year at this time California was producing approximately 525,000 bbls. per day under stringent curtailment. Since that time there has been a breakdown in curtailment work at Long Beach, Huntington Beach and Santa Fe Springs with the result that there is little curtailment in these three fields except by major companies and a few progressive independent operators. In spite of this, crude oil production is approximately 25,000 bbls. below the daily output at the same time last year. This drop can be attributed to a normal decline in producing fields, artificial restraint of production in flush fields and a substantial reduction in drilling operations throughout the State. If this condition can be maintained, conditions on the Pacific Coast should not be as unsettled as those prevailing during the greater part of 1931.

Continued Decline Expected

With the exception of Dominguez, West Coyote and Inglewood, Los Angeles Basin fields should continue declining from now on until the economic limit of production in reached. Deep tests are being drilled in the Inglewood and Long Beach Fields but the success of this exploration work is problematical. There is no question of course that deeper productive zones exist in the Inglewood, West Coyote and Dominguez Fields but the major companies holding this acreage will not engage in competitive drilling unless forced to do so. The three deep tests being drilled in the Inglewood Field by the Allison Syndicate, Baldwin Hills Syndicate and the Baldwin Hills Oil Co. are located around the edge of the structure and, while this work might precipitate deep zone development, operators holding productive acreage within the existing confines of the field are anxious to retard future drilling as long as possible.

The Union, Associated and Shell have been obliged to initiate deep zone development in the Dominguez Field of Los Angeles Basin due to stringent lease requirements but it appears probable that this compulsory drilling can be substantially reduced if the Sharkey bill is ratified by the voters of the State on May 3. This measure, it is believed, will afford relief and enable these operators to reduce development work without being subjected to litigation or penalized because of the inability to complete development work within a specified time limit. The West Coyote Field of Los Angeles Basin, where the Standard is drilling several wells, has been held back longer than any other field in the southern part of the State. Deeper productive horizons have been known to exist below present production for years. The so-called 99 zone in this field was discovered previous to 1925 and subsequent development has proven up the existence of another separate productive horizon below this zone. The Standard controls the entire productive acreage in the West Coyote Field and is therefore in a position to retard development as long as necessary.

Many Wells Shut In

Almost one-half of the total number of oil and gas wells in California are shut in either because of curtailment or the inability of operators to produce economically under the existing price schedules. A recent check indicates a total of 17,412 wells in California capable of producing oil and gas under favorable conditions. Of this number, 8,824 were producing, 6,270 shut in and 2,318 suspended. Practically all of the wells shut in because of curtailment work were drilled by major companies. Midway-Sunset head the curtailment list with a total of 1,689 wells shut in because of curtailment, followed by Kern River with 1,520, Coalinga with 779 and Lost Hills-Belridge with 547. The 6,270 wells shut in are capable of producing approximately 375,000 bbls. per day.

The normal decline in the Long Beach and Santa Fe Springs Fields has enabled operators gradually to recomplete wells which had been shut in for a long time because of curtailment without seriously disturbing the production equilibrium. This process has been going on for months, but at the present rate of decline it will be another year or so before major companies will be able to lift the curtailment program in either of these two fields and there is little prospect of any general resumption in production within two or three years unless consumption is substantially increased either by export shipments or shipments of crude and refined oils to the Atlantic seaboard. Even under these conditions, operators will be obliged to limit the production of Kettleman Hills, Dominguez, Elwood, Ventura Avenue and any other areas having deeper productive zones if they hope to have a satisfactory price structure.

Depletion of the deeper zones at Santa Fe Springs and the inability of operators economically to produce small wells in the lower horizons under the existing price structure have resulted in the plugging back of 25 or 30 wells during the past several months. Since the first of the current year 16 wells have been plugged back and returned to production in zones higher than those previously produced. With a few exceptions, this reconditioning work has not resulted in the completion of any large wells for the simple reason that the shallower zones, like the deep horizons, are pretty well shot. Operators like the Union Oil Co. and the General Petroleum, which have blocks of contiguous acreage instead of subdivided town lots, are able to show satisfactory individual well production because the acreage back of the townlot area is not overdeveloped and therefore has not been subjected to excessive drainage. These properties, likewise, have been consistently repressured with satisfactory results.

Eight Plugged Back in January

During January, 1932, eight wells were plugged back from the Clark zone to the Meyer zone, two from the Clark to the O'Donnell zone, one from the O'Donnell to the Meyer, one from the Clark to the Buckbee and one from the Buckbee to the Nordstrum zone. This reconditioning work has not stimulated daily production to any great extent except in cases where the wells were dead or produced below the economic limit in the deep zones. The George F. Getty Co. reconditioned five wells in the Santa Fe Springs Field during January. Of this group, four were plugged back from the Clark to the Meyer zone. These included No. 26 Mitchell, plugged from 7,985 feet to 4,575 feet and recompleted pumping 192 bbls. of oil cutting 15 per cent; No. 28 Mitchell, plugged from 7,983 feet to 4,570 feet and recompleted pumping 150 bbls. of oil cutting 35 per cent; No. 41 Mitchell, plugged from 7,925 feet to 4,550 feet and recompleted pumping 110 bbls. cutting 15 per cent; and No. 43 O'Connell, plugged from 7,950 feet to 4,501 feet and returned to production pumping 115 bbls. cutting 10 per cent. In addition to these wells plugged back from the Clark to the Meyer zone, the Getty company recompleted No. 49 Nordstrum pumping 250 bbls. of 33.1 gravity oil cutting 35 per cent after plugging back from the Buckbee zone at 5,885 feet to the Nordstrum zone at 5,300 feet.

The Standard got a surprise during the course of its reconditioning work at Santa Fe Springs when it plugged back No. 24 Walker from 7,387 feet to the Meyer zone at 4,481 feet and got a 100-bbl. pumper. The interest which attaches to the completion of this well lies in the fact that no production was secured in the deep zone at 7,387 feet and that it has been standing suspended for practically a year. In addition to completing this well, the Standard recompleted three other wells in the Santa Fe Springs Field during the present year after plugging back from the Clark to the Meyer zone. This work included No. 16 Weisel, plugged back from 7,945 feet to 4,578 feet and returned to production pumping 150 bbls. of oil cutting 25 per cent; No. 19 Weisel, plugged back from 7,512 feet to 4,579 feet and recompleted pumping 170 bbls. per day cutting 25 per cent; and No. 23 Walker, plugged from 7,851 feet to 4,505 feet and recompleted pumping 50 bbls. of 33.1 gravity oil cutting 30 per cent.

General Petroleum Wells Reconditioned

The General Petroleum has reconditioned five wells at Santa Fe Springs since the new year opened. These are No. 168 E, plugged back from the Clark zone at 8,025 feet to the Meyer zone at 4,526 feet and recompleted pumping 101 bbls. of 32.1 gravity oil cutting 28 per per cent; No. 152 G, plugged from the Clark zone at 7,999 feet to the O'Connell zone at 7,201 feet and returned to production flowing 110 bbls. of oil per day; No. 143 B, plugged from 7,975 feet to 7,295 feet and recompleted pumping 75 bbls. of 30.7 gravity oil per day, and No. 213, plugged from the Clark zone at 7,707 feet to the Buckbee zone at 6,495 feet and recompleted pumping 40 bbls. per day of 29.1 gravity oil cutting 50 per cent. In addition to these four wells, located on the Santa Fe lease, the company reconditioned No. 179 D on the Santa Fe Community lease and returned it to production pumping 112 bbls. per day after the hole had been plugged back from 5,348 feet to 4,999 feet. The Texas Company got a good well on the Steinly lease when No. 6 was plugged back from the Clark zone at 8,060 feet to the Meyer zone at 4,526 feet and returned to production pumping 394 bbls. of 35.1 gravity oil cutting 2 per cent. The Elmer Oil Co.'s No. 5 Jameson, on the other hand, was a disappointment after being plugged back from the O'Connell zone at 6,850 feet to the Meyer zone at 4,500 feet, as it was good for only 10 bbls. per day on the beam. The log showing drilling data on the Bellview Oil Syndicate's No. 5 Grohs is of more than passing interest because this well was deepened from the Nordstrum to the Buckbee zone instead of being plugged back. It failed to result in a natural flow but was recompleted doing 194 bbls. of 31.9 gravity oil per day on a compressor. During the past two weeks, California operators have filed 24 notices of intention to recondition present producing wells.

Kettleman Hills

Although there were no completions listed in the North Dome of Kettleman Hills during the past week, this field occupied a prominent place due to the staking of two new locations and the suspension of work on a drilling well located between the red and blue lines in Section 23-22-18. The latter project was the Standard's No. 25-23 Q, which was suspended at 7,414 feet after the top of the brown shale had been logged at 7,385 feet. The hole was filled with heavy re-

TANKER SHIPMENTS FROM LOS ANGELES TO DOMESTIC AND FOREIGN PORTS

	Feb. 27, 1932		Feb. 20, 1932			
	Total this week	Daily average	Total last week	Daily average	This year to date	Same time last year
Intercoastal-domestic—						
Diesel and gas oil	.....	.....	.....	.....	.....	606,269
Gasoline	.....	.....	.....	.....	698,745	2,470,176
Foreign exports—						
Crude oil	136,386	19,484	165,321	23,617	1,464,220	1,204,556
Fuel oil	180,408	25,773	175,397	25,057	1,535,201	2,666,501
Diesel and gas oil	.....	.....	61,351	8,764	371,333	576,331
Gasoline	21,311	3,044	401,141	57,306	1,537,621	1,765,533
Kerosene	.....	.....	.....	.....	342,467	174,755
Naphtha distillates	.....	.....	.....	.....	41,175	.....
Coastwise-domestic—						
Crude oil	263,132	37,590	186,947	26,707	2,460,418	2,731,278
Fuel oil	220,084	31,441	319,040	45,577	2,601,078	2,932,003
Diesel and gas oil	25,061	3,580	44,178	6,311	350,570	330,848
Gasoline	192,824	27,546	250,634	35,805	1,968,685	1,912,690
Kerosene	.....	.....	2,269	324	27,900	63,281

TANKER SHIPMENTS FROM SAN FRANCISCO TO DOMESTIC AND FOREIGN PORTS

Intercoastal-domestic—						
Gasoline	.....	.....	68,101	9,729	68,101	63,975
Lubricants	.....	.....	7,849	1,121	7,849	11,000
Foreign exports—						
Crude oil	.....	.....	116,902	16,700	174,227	6,010
Fuel oil	61,675	8,811	.....	.....	442,083	63,610
Diesel and gas oil	55,195	7,885	.....	.....	165,657	113,156
Gasoline	7,725	1,104	.....	.....	593,079	318,272
Kerosene	.....	.....	.....	.....	185,350	190,412
Lubricants	.....	.....	.....	.....	8,225	.....
Coastwise-domestic—						
Fuel oil	46,140	6,591	94,228	13,461	464,500	606,996
Diesel and gas oil	19,880	2,840	.....	.....	136,699	5,213
Gasoline	105,546	15,078	7,498	1,071	674,254	422,288
Kerosene	.....	.....	.....	.....	10,857	16,877

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tary mud and no further work will be undertaken as recent developments indicate the probability that this well is located either off structure or very close to the edge.

Simultaneously with the suspension of drilling on No. 25-23 Q, the Standard announced plans to start work on an outpost in the extreme western part of the field. This new well, which will be drilled in Section 19-21-17, is located between the red and blue lines marking the proven and potentially productive acreage of the North Dome. It is a little over one-half mile west of the Huffman area where the Union, Standard, Superior and Kettleman North Dome Association have producing wells, but is, nevertheless, the most westerly well to be started in the Hills up to the present time.

Another important outpost is to be started in the west end of Kettleman Hills in the near future and the outcome of this work may have a decided effect on future operations. This new test is to be drilled by the North Kettleman Oil & Gas Co., recently organized by P. M. Longan, H. F. Alexander, E. A. McKenna and others. Drilling operations, which will be under the personal supervision of Ed McAdama, are expected to get under way within the next 15 days. This outpost will be drilled on fee acreage, located just outside of the blue line, which engineers established early last year as the extreme outer limits of production. It is reported that the Standard and Kettleman North Dome Association, both of which will profit if commercial production is secured, are contributing some dry hole money, to be repaid out of any production developed. The Union Oil Co. and Belmont Investment Co. hold a 480-acre government lease between this well and the outpost to be drilled by the Standard in Section 19-21-17.

May Extend Red Line

If either of these wells gets commercial production it will necessitate an extension of the red line by the Kettleman North Dome Association.

The North American's No. 1 Elsinore in the North Dome of Kettleman Hills sanded up a few days ago and preparations are already under way to clean out the hole and then run a water witch in order to ascertain where the water in this well is coming from. No. 1 Elsinore was flowing 1,852 bbls. of oil cutting 45 per cent water just before it sanded up. There is some question as to the source of this water, although several petroleum engineers are of the opinion that the cut is due to edgewater. This view is partly supported by the fact that the well in question is located rather well out on the north flank of the North Dome structure. In the Middle Dome of Kettleman Hills, the Standard picked up the Temblor at 7,525 feet and accordingly has cemented a string of pipe at 7,513 feet before drilling ahead. This well, barring mechanical trouble, should indicate definitely the productivity of the Temblor in the Middle Dome. This well should open up a new field in the Middle Dome as No. 1 Burbank of the Petroleum Securities indicated the existence of commercial production if water can be shut off.

Gas Waste Reduced

Dry gas blown to the air during January at Kettleman Hills amounted to 163,800,000 feet, as compared with 176,292,000 feet blown to the air during the month of December. Total gas waste in the State during January amounted to 38,000,000 feet per day, the lowest registered in many months. Kettleman's total gas output during January was 10,675,889,000 feet, while the field's natural gasoline output was 13,495,685 gallons. The State's total output of natural gas was 35,060,973,000 feet, from which was recovered 51,204,541 gallons of casinghead gasoline.

Sales of dry gas in California during January amounted to 576,000,000 feet per day, as compared with December daily sales of 609,000,000 feet. Goleta, the newest gas field in the State, produced 15,000,000 feet daily, all of it being sold. Buttonwillow gas field was shut in except for gas used for drilling operations. Ventura Avenue followed Kettleman Hills in the production of natural gas, followed by Long Beach, Santa Fe Springs, Playa Del Rey, Elwood and Belridge in the order named. Sales of dry gas at Kettleman Hills totaled 309,000,000 feet during January, as against sales of 372,250,000 feet per day during the preceding month.

Existing low prices for crude and refined oil and the highly competitive condition existing in the marketing branch of the industry does not offer much hope of an early adjustment. Crude oil production, which was supposed to be reduced to a maximum of 456,700 bbls. per day by January 1, 1932, is still averaging around 500,000 bbls. Producers and refiners in close touch with the situation realize that no upward revision in prices is possible as long as operators continue producing to the maximum. This condition prompted Rush M. Blodget, general manager of the Oil Producers Sales Agency, to advise agency members a few days ago that "the immediate outlook is not encouraging. During December, the purchasing companies added 583,834 bbls. of oil to storage, being at the rate of 18,832 bbls. per day. During January they added 490,826 bbls. to storage, same being at the rate of 15,834 bbls. per day. Early unofficial reports would indicate that additions to storage have now passed the 30,000-bbl. mark. Foreign and intercoastal shipments, notwithstanding the war in the Orient, have fallen for the months of December, January and February far below the estimates upon which the state allowable is determined.

Starting Wells in Fruitvale Field

Several new wells are being started in the Fruitvale Field of Kern County and three or four more are expected to get under way within the next two weeks. This work is not expected to cause any great disturbance as far as crude oil production is concerned, due to the fact that the refiners are not anxious about

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WILDCAT ACTIVITY NORTHEAST OF EAST POOL IN MICHIGAN

By George A. Whitney

MOUNT PLEASANT, Mich., Mar. 14. The Pure Oil Co.'s No. 1 Mason-Kidder farm, NE NE NE, Section 17, Greendale Township, Midland County, reported last week produced an initial of 1,890 bbls. This well topped the Dundee formation at 3,479 feet, the upper oil pay being found at 3,506 feet, and the total depth of 3,546 feet. The same company's No. 6 Sias farm NW NW SW, Section 8, same township, found top of Dundee at 3,512 feet with pay at 3,540 feet, total depth 3,585 feet, the initial production being 125 bbls.

In Livingston County, B. A. Browne and others went through the Dundee formation at 1,152 feet on the Albert L. Smith farm, SE SE SW, Section 31, Oceola Township, and have a dry hole. The well is in the southeast corner of the lease.

The wildcat of the Pure Oil Co. on the William T. Yeo farm, NE NE, Section 2, Horton Township, Ogemaw County, is shut down at 2,800 feet where water was found and attempt is being made to shut off the water, which comes from the Dundee.

Wildcat prospecting in the area north of the proven East Pool and forced offset drilling in the main field have combined to bring about renewed activity in the Mount Pleasant-Midland Field, and checking up on the work showed more than 30 operations now under way. Convinced that the oil-bearing structure east of Mount Pleasant makes a northward swing in the area of the present East Pool of more than 20 big oil producers, operators are turning their attention to testing the previously unprospected area. The tests are being pushed to the Dundee in scattered areas of the north part of the field, extending into Geneva Township, Midland County. A line fight between developing companies has brought stimulated activity in the proven East Pool and the area immediately bordering it. The belief that rich oil pools lie to the north and east beyond the field was strengthened this week with the report the No. 1 W. S. Root, being drilled by Walter Lee McClanhan in Section 12, Greendale Township, about 1½ miles east and a half mile north of No. 1 Struble, is running about 3 feet higher. Another test which is being closely watched is

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IMPORTANT NORTHERN CALIFORNIA WILDCATS

Company, well, location—	S.-T.-R.	Depth	Status
Standard, No. 1 Santa Rosa Island, Santa Barbara Co.	.....	....	building rig
Barnsdall, No. 1 Los Alamos, Santa Barbara Co.	31- 8-33	2,803	sd. sh. drilling
Western Gulf, No. 1 Santa Marja, Santa Barbara Co.	5- 9-33	8,566	fishing
Midwest Oil Co., No. 1 Los Alamos, Santa Barbara Co.	2- 7-35	3,450	suspended
General Pet., No. 4 Goleta, Santa Barbara Co.	16- 4-29	1,330	plug 900 ft.
General Pet., No. 133 Goleta, Santa Barbara Co.	21- 4-28	2,030	suspended
General Pet., No. 134 Goleta, Santa Barbara Co.	21- 4-28	2,053	suspended
General Pet., No. 136 Goleta, Santa Barbara Co.	21- 4-28	2,047	suspended
General Pet., No. 137 Goleta, Santa Barbara Co.	21- 4-28	2,050	suspended
Bowles Oil Co., No. 140 Goleta, Santa Barbara Co.	21- 4-28	2,065	suspended
U. S. Pet., No. 141 Goleta, Santa Barbara Co.	20- 4-28	2,004	suspended
U. S. Pet., No. 142 Goleta, Santa Barbara Co.	20- 4-28	2,012	suspended
U. S. Pet., No. 143 Goleta, Santa Barbara Co.	20- 4-28	2,010	suspended
El Camino, No. 149 Goleta Tideland, Santa Barbara Co.	22- 4-28	2,010	suspended
Bellview Oil Co., No. 159 Goleta, Santa Barbara Co.	24- 4-29	2,099	suspended
Johnson & Strickland, No. 1-A Goleta, Santa Barbara Co.	19- 4-27	4,886	cleaning out
The Texas Company, No. 3 Carpinteria, Santa Barbara Co.	34- 4-25	131	sd. drilling
Sovereign Oil Co., No. 1 Guadalupe, Santa Barbara Co.	20-10-35	5,500	suspended
Pacific Western, No. 1 Gibralter, Santa Barbara Co.	14- 5-27	2,345	suspended
Pacific Finance Co., No. 1 Carpinteria, Santa Barbara Co.	Tideland	2,011	suspended
Associated, No. 1 Rincon Creek, Ventura Co.	19- 4-24	2,080	suspended
Bell, E. H., No. 1 South Mountain, Ventura Co.	22- 3-21	2,351	sd. sh. drilling
Pure Oil Co., No. 1 S. F. Canyon, Ventura Co.	15- 4-21	2,591	suspended
Union, No. 1 Calumet, Ventura Co.	3- 3-19	...	location
Woodruff Oil Co., No. 1 Miguelito, Ventura Co.	4- 3-24	....	location
Sycamore Oil Co., No. 1 Conejo, Ventura Co.	24- 1-20	1,402	br. sh. drilling
American Oil Co., No. 1 Conejo, Ventura Co.	33- 2-20	1,590	cleaning out
Graham & Loftus, No. 1 Goose Lake, Kern Co.	20-27-22	6,494	sd. sh. drilling
General Pet., No. 1 Buttonwillow, Kern Co.	6-28-23	2,615	prod. test
Wilshire Oil Co., No. 1-A Buttonwillow, Kern Co.	7-29-24	7,000	suspended
Milham Expl. Co., No. 11 Buttonwillow, Kern Co.	8-28-23	1,994	bl. sh. drilling
Furman, T. H., No. 1 McKittrick, Kern Co.	22-29-21	3,401	sd. sh. drilling
Welport Oil Co., No. 8 McKittrick, Kern Co.	26-29-21	1,298	sd. sh. drilling
Federal Drlg. Co., No. 1 Buena Vista, Kern Co.	20-31-24	5,380	suspended
General Pet., No. 1 Belridge, Kern Co.	30-28-21	8,240	br. sh. drilling
Wallace, K. C., No. 1 Belridge, Kern Co.	32-29-21	4,222	suspended
Rio Cal Pet., No. 1 Shale, Kern Co.	2-27-18	2,355	suspended
Wicker, Sy., No. 1 Arvin, Kern Co.	12-30-28	3,850	suspended
Shell, No. 1 Weed Patch, Kern Co.	29-30-29	5,910	suspended
Colter, L. G., No. 2 Weed Patch, Kern Co.	15-30-29	2,006	20 B/D
Fullerton Oil Co., No. 1 Semitropic, Kern Co.	9-28-24	709	sd. drilling
Cumberland Oil Co., No. 2 Devils Den, Kern Co.	17-26-28	3,225	suspended
Totem Oil Co., No. 1 Devils Den, Kern Co.	29-25-19	rig	rigged up
Regina Oil Corp., No. 1 Mojave, Kern Co.	26-10-14	1,065	suspended
Meridian Oil Co., No. 1 Mojave, Kern Co.	11- 9-15	4,000	suspended
Kendall Dev. Co., No. 1 Mojave, Kern Co.	27-11-9	1,130	hd, sd. drilling
Harding, J. B., No. 1 Mojave, Kern Co.	5-10-10	1,030	redrilling
Barnsdall Oil Co., No. 1 Tejon, Kern Co.	15-11-20	4,400	sd. sh. drilling
Ritchie, J. J., No. 1 Tejon, Kern Co.	33-11-19	6,025	suspended
Descanso Oil Co., No. 1 Tejon, Kern Co.	31-11-19	2,103	hd, sd. drilling
Associated, No. 1 Jacalitos, Fresno Co.	22-21-15	6,197	suspended
Kingsburg Expl Co., No. 1 Kingsburg, Fresno Co.	30-16-23	2,430	cleaning out
Kent & McDonald, No. 1 Carrizo, San Luis Obispo Co.	3-32-22	2,630	suspended
Trav-El Oil Co., No. 1 Carrizo, San Luis Obispo Co.	7-32-22	2,450	suspended
Indian Dome Oil Co., No. 1 Edna, San Luis Obispo Co.	26-31-12	3,380	suspended
Martin, J. D., No. 1 Edna, San Luis Obispo Co.	5-31-13	3,070	redrilling
Paso Robles Oil Co., No. 1 Edna, San Luis Obispo Co.	27-27-11	4,160	suspended
Emerich Oil Co., No. 1 Atascadero, San Luis Obispo Co.	13-28-12	1,800	sd. sh. drilling
Schilling, C., No. 1 Atascadero, San Luis Obispo Co.	1-29-12	1,650	suspended
Pacific Inland, Well No. 1, Monterey Co.	19-23-15	2,280	suspended
Brown, W. F., No. 1 Parkfield, Monterey Co.	15-23-14	1,051	cleaning out
Guess, E. B., No. 1 Corcoran, Kings Co.	7-21-21	6,197	suspended
Niel, W. B., No. 1 Dudley Ridge, Kings Co.	32-22-20	rig	rigged up
Guess, E. B., No. 1 Dudley Ridge, Kings Co.	12-22-22	2,210	suspended
Kettleman Nat'l Oil Co., No. 1 Dudley Ridge, Kings Co.	18-22-19	1,012	resume work
Irma Investment Co., No. 2 Dudley Ridge, Kings Co.	7-23-20	1,224	testing
Eagle Oil Co., No. 1 Dudley Ridge, Kings Co.	15-23-20	1,125	cleaning out
Valley Expl. Co., No. 1 Dudley Ridge, Kings Co.	12-23-19	1,302	cemented
Knudsen & Schmidt, No. 1 Reef Ridge, Kings Co.	36-23-17	5,894	suspended
Seymour, L. W., No. 1 Avenal, Kings Co.	10-23-16	1,148	suspended
Tulare Basin Gas Co., Well No. 1, Kings Co.	2-23-19	1,193	bl. sh. drilling
Magee & Stone, No. 1 Alpaugh, Kings Co.	34-24-22	mtl.	building rig
Tulare Oil Co., No. 1 Corcoran, Tulare Co.	20-22-22	rig	suspended
Ducor Pet. Co., No. 1 Ducor, Tulare Co.	14-24-27	2,200	redrilling
Inland Valley Oil Co., No. 1 Visalia, Tulare Co.	24-17-24	2,092	suspended
Gravity Expl. Co., No. 1 Alpaugh, Tulare Co.	11-24-23	rig	suspended
Ellis & Sanford, No. 1 Tulare Lake, Tulare Co.	20-24-23	1,920	plug 1,487 ft.
Twin State Oil Co., No. 1 Point Arena, Mendocino Co.	14-12-17	7,694	suspended
Napa Oil Co., No. 1 Griffith, Napa Co.	7- 8-3	2,848	cemented
Orinda Pet., Well No. 1, Contra Costa Co.	32- 1-3	2,120	suspended
Colusa Oil Co., No. 1 Bush, Colusa Co.	31-15-4	1,040	suspended
Oakdale Oil Co., No. 1 Oakdale, Stanislaus Co.	3- 2-10	4,750	suspended
Hilderbrandt, R., No. 1 Crows Landing, Stanislaus Co.	36- 6-7	1,130	suspended
Orland Oil Synd., No. 1 Orland, Tehama Co.	31-23-3	3,040	suspended
Pacific Northern Oil Co., No. 1 Guinda, Yolo County	23-12-3	2,005	cleaning out

IMPORTANT SOUTHERN CALIFORNIA WILDCATS

Company, well, location—	S.-T.-R.	Depth	Status
Hines Pet., No. 1 Ocean Park, Los Angeles Co.	9- 2-15	7,414	suspended
Taylor Oil Co., No. 1 Culver, Los Angeles Co.	12- 2-15	6,238	suspended
Westwood Oil Co., No. 2 Hermosa, Los Angeles Co.	6- 4-14	2,151	testing
Staple Oil Co., No. 1 Manhattan, Los Angeles Co.	24- 3-15	2,700	suspended
Lawndale Pioneers, Inc., No. 1 Peck, Los Angeles Co.	20- 3-14	6,378	testing
Ranger Pet. Co., No. 1 Watson, Los Angeles Co.	28- 4-13	3,785	pump 35 B/D
Brubaker, W. O., No. 1 Van Nuys, Los Angeles Co.	11- 2-15	2,700	suspended
Rucker & Croul, No. 2 Puente, Los Angeles Co.	27- 2-10	2,200	suspended
El Dorado Oil Co., No. 1 Puente, Los Angeles Co.	30- 2-9	2,250	suspended
Cudahy Oil Co., No. 1 Bell, Los Angeles Co.	30- 2-12	1,370	suspended
Jones, W. L., No. 1 Bell, Los Angeles Co.	31- 2-12	1,202	redrilling
Weist Oil Co., No. 1 Montebello, Los Angeles Co.	34- 1-11	4,902	suspended
Blinn & Gray, No. 1 Montebello, Los Angeles Co.	6- 2-11	5,060	recemented
Wardell & Menichini, No. 1 Montebello, Los Angeles Co.	7- 2-11	rig	rigged up
Yellowstone Oil Co., No. 1 Alhambra, Los Angeles Co.	24- 1-13	3,919	suspended
Yellowstone Oil Co., No. 2 Alhambra, Los Angeles Co.	19- 1-12	2,015	suspended
Davidson Oil Co., No. 1 Monterey Park, Los Angeles Co.	32- 1-12	....	location
Rucker, L. W., No. 1 Calabasas, Los Angeles Co.	26- 1-17	1,004	cleaning out
Caballero Estates, No. 1 Calabasas, Los Angeles Co.	23- 1-16	1,460	cleaning out
Marble, Willard, No. 1 Chatsworth, Los Angeles Co.	6- 2-16	1,395	suspended
Ajax Pet., No. 1 Newport, Orange Co.	21- 6-10	7,259	gr. sd. drilling
Beck, Alfred, No. 1 Corona, Riverside Co.	8- 4-6	1,110	suspended
Spindletop Oil Co., No. 1 Salton Sea, Riverside Co.	25- 7-10	3,590	sd. sh. drilling
Duncan, N. L., No. 1 Sage Brush, Riverside Co.	8- 4-6	1,157	suspended
Colan Dev. Co., No. 1 Redlands, San Bernardino Co.	25- 1-2	2,392	redrilling
Mason Oil Co., No. 1 Salton Sea, Imperial Co.	1-17-15	635	sd. sh. drilling
Woods, D. H., No. 1 Salton Sea, Imperial Co.	7-11-16	674	sd. sh. drilling
Borderland Oil Co., No. 1 Encinitas, San Diego Co.	12-13-4	2,519	suspended
Borderland Oil Co., No. 2 Encinitas, San Diego Co.	12-13-4	2,575	sd. sh. drilling
South Bay Oil Co., No. 1 Border, San Diego Co.	31-18-2	1,243	suspended
Itasca Pet. Co., No. 1 Mesa, San Diego Co.	33-18-1	1,700	cemented
Oklahoma Oil Corp., No. 1 Palms, San Diego Co.	25-11-8	1,501	sd. sh. drilling

To Drill Again in Century Old Field

Cumberland County, Kentucky, Reports 50-Bbl. Producer at 450 Feet. Completions and Operations in Central West Area

By George A. Whitney
Staff Correspondent, Central West Fields

FINDLAY, Ohio, Mar. 14.—There are 15 wells drilling and five extra rigs up in the old Lima Field. Last week a well worth while was found by J. H. Murphy & Sons in No. 3 on the Mary Getuldig farm, Section 11, Hopewell Township, Seneca County, in the Tiffin Field, that produced above 100 bbls. initially from the Trenton lime formation and four other wells are drilling in the same township. In Lucas County, west of Toledo, there are five wells under way, while in Wyandot County there are two rigs up and three wells drilling. Shelby County has two wells under way; Darke County, one; Putnam County, one, and one in Ottawa County.

CENTRAL OHIO

Eight completions were reported from the Central Ohio Field, one being a producer for 6 bbls. in 24 hours, five were dry holes and two were gas wells. In Stark County, Fred A. Brendall and others brought in a nice gas well in No. 4 J. C. Steiner farm, Section 16, Jackson Township, in the Clinton lime at from 4,275-4,315 feet, and are drilling No. 5 same farm. This firm had six wells drilling in the same township: No. 1 Emma P. Smith farm, Section 11; No. 7 Lake Cable Co., Section 14; No. 1 J. W. Hines, Section 9, and No. 1 H. and A. Huthmacher farm, Section 11. The East Ohio Gas Co. dropped into a dry hole in No. 1 Mary A. Ginther farm, Section 3, Lawrence Township, where the pay was badly broken at 3,941 feet. Same company is drilling eight wells in Jackson Township, same county, as follows: No. 1 J. and C. Albright, Section 8; No. 2 George H. Charls, Section 24; No. 3 Howard B. Fawcett, Section 17; No. 2 Elza Hall, Section 12; No. 1 Brainard K. Pry, Section 15; No. 2 Leo Frank, Section 14, and Nos. 4 and 5 on the T. K. Harris, No. 2 farm, Section 25. White and Bacon made a location for No. 2 on the Besse J. Slagle, Section 14. Athens Oil & Gas Co. is drilling No. 1 Joe King, Section 14; Wiser Oil Co. is drilling No. 2 Lake-O-Spring property, Section 14, and W. F. Shelter is shut down on the A. L. Funk farm, Section 22, same township.

Ohio Fuel Gas Co.'s No. 3-5580 James Garman farm, Section 16, Homer Township, Medina County, struck a poor sand, resulting in a dry hole.

Smith and others found a very nice gas producer on the Charles A. Smith farm, Section 19, Green Township, Summitt County, in the Clinton lime, from 4,007-41 feet. Cameron and others have a rig on the F. H. Mason, Section 13, Franklin Township, same county.

In Licking County, Fallsburg Township, the Emerald Petroleum Co.'s test on the Homer Barcus farm, Section 10, which found a shallow pay from 677-78 feet, where it made an initial of 6 bbls. Settles Oil Co. is drilling No. 5 Nellie Smith farm, Section 17, Perry Township, and Armstrong & Lytle found a dry hole in No. 5 J. W. Motherspaw farm, Lot 12, Franklin Township, at 1,550 feet.

Robert Straker and others are drilling on the Grover Wilson farm, in the fourth quarter of Washington Township, Muskingum County.

In Athens County the Ohio Fuel Gas Co. struck water in No. 1-5639 Roy C. Caskins farm, Section 6, Cannan Township, at 1,615 feet. Same company is drilling No. 2-3563 Gertrude Shurick farm, fractional Section 3, Berne Township, same county. Ohio Oil & Gas Co. is drilling No. 5 M. Jones, Section 24, Alexander Township, same county.

In Guernsey County, Cambridge Township, Charles Smith is drilling on the Dixon farm, Section 10, and C. C. Wharton is drilling No. 3 Besse Taylor farm, Section 13, Westland Township, same county.

In Crawford County, Byron Crum is shut down at his test on his own farm, Section 34, Auburn Township, at a depth of 745 feet.

Earnest English and others report a dry hole on the M. R. McTeague farm, Section 25, Pike Township, Perry County. Kachelmacher Oil Co. has a rig still standing for No. 7 on the Hemlock Coal Co.'s land, Section 25, Coal Township, same county.

City Natural Gas Co. of Lancaster is reported around 1,200 feet on the John D. Shullt farm, Section 30, Marion Township, Hocking County.

Simpson and Rice are drilling on the Karr farm, Section 11, Sutton Township, Meigs County. Simms and others are drilling No. 6 Alva M. Noore farm, Section 24, Bearfield Township, Perry County. Pure Oil Co. is drilling on the Pius Snider farm, Section 11, Reading Township, also in Perry County. Mid-East Gas Co. is drilling on the D. C. Devers farm, Section 10, same township. Shenker and others are starting a test on the E. L. Vansickle farm, Section 5, same township and county. Atha Oil & Gas Co. is cleaning out No. 1 E. M. Croft farm, Section 9, Madison Township, Perry County, at a depth of 2,956 feet, and to test casing.

INDIANA

Wildcatters are busy in many parts of the Indiana fields in hope of finding something worth while in either oil or gas, but recently numerous dry holes are being found, with a scarcity of commercial producers. The week shows eight completions, one producer for 40 bbls., one gas well and six dry holes.

The best producer was the Big Four Oil & Gas Co.'s No. 2 Lottie Hope farm, NE, Section 18, Washington Township, Gibson County, which shows a natural flow of 40 bbls. Sullivan County reports a gas well with 1,500,000 feet owned by Pierson and others on the Dolphia Sludder farm, NW NW, Section 20, Curry Township, with the pay sand found at 250 feet.

In the extreme southern part of the State, Steffy & Grass' No. 1 George Sauter farm, NW, Section 3, Hupp Township, Spencer County, was a dry hole at 1,050 feet, and Medley Brothers' No. 1 J. Phillips farm, same township, was also a duster. E. M. Treat Co. made a location for a second test on the Catherine Bretz farm, in Ohio Township, and the Maxwell Petroleum Co. is drilling on the Anna Hawk farm, NW, Section 8, Ohio Township.

In Perry County, W. S. M. Hughes and others found a dry hole on the William Dotson farm, SE, Section 13, Clark Township, at a depth of 600 feet.

O. A. Thayer is drilling on the Anna Sproat farm, NW, Location 290, Busseron Township, Knox County.

Fountain Oil & Gas Co.'s test on the

(Continued on Page 61)

Washington County, Ohio, Test Flows

Production From Third Warren Formation May Open An Extensive Pool. Progress of West Virginia and Pennsylvania Operations

By Staff Correspondent

PITTSBURGH, Pa., Mar. 14.—Operations in the three districts of the lower Eastern fields continue at a low rate. The refinery demand for Pennsylvania Grade crude is fair and slightly above production figures.

During the week one oil well was completed, adding only 30 bbls. to the production figures, four gas wells, one very fair, were drilled in, and there were reports of nine dry holes.

SOUTHEAST OHIO

The William Harris and others' test on the Joseph Crago farm on the headwaters of Cady Run in Grandview Township, Washington County, continues to hold the interest of eastern operators. To date, the Injun, Squaw and Berea sands have not yet been cased off, but casing has been hauled in to do this. The well continues to make intermittent flows from the Third Warren formation, the top of which was struck at 2,916 feet and which is reported to be about 20 feet thick. Practically all available acreage has been leased up in this as well as Independence Township, and geologists have expressed the opinion that the opening of the Third Warren is indicative of a pool, which may be quite extensive.

The only producer completed in the Eastern fields was the second test of the Preston Oil Co. on the M. H. Packard lease, Lot 2, Section 16, Chatham Township, Medina County. It was completed at 446 feet and produced 30 bbls. the first day after shot. In the same township, and in the thickly drilled yet profitable shallow sand, on Lot 20, E. R. Edson & Son Co. is drilling No. 36 on the Morris A. and Eva Franks farm, and No. 34 on the George W. Packard lease No. 1, Lot 4. On Lot 3, the Oko Oil & Gas Co. is drilling No. 54 on the Henry Essig lease.

In Ashland County, A. G. Talbott and others drilled No. 5 on the David Horn lease of 80 acres in Section 4, Lake Township. The Berea sand was dry at a depth of 564 feet. In Athens County, the Ohio Oil & Gas Co. abandoned its No. 3 on the R. W. Jones farm, near Fisher, Section 24, Alexander Township. It was drilled to 1,330 feet and was dry in the Grit formation.

In Monroe County, and in the NW, Section 27, Green Township, John Crawford and others drilled their No. 3 on the Forest and Minnie Schlabach farm to 540 feet and in the Buell Run sand. It was abandoned as a dry hole.

Drilling in Ohio

In Washington County, the First National Bank of New Matamoras and others, Account No. 7, have started drilling a second test on the E. F. Piatt farm, Section 3, Louden Township. In Independence Township, J. F. and Anna B. Campbell are drilling No. 4 on the Ed Matthews farm. In Fearing Township, T. N. Curtis is about in the sand with No. 11 on the Robert Biehl farm in Lot 25.

In Perry County, the Pure Oil Co. is making headway with its test on the Pius Snyder farm in Reading Township and Section 11. It will be due in shortly. In the same township, the Mid East Gas Co. is continuing with its test on the Deaver heirs' farm in Section 10. The Atha Oil Co. remains shut down on the Samuel Frazier farm, Section 9, Madison Township, at 3,050 feet.

WEST VIRGINIA

No oil producers were completed in West Virginia. The completions consisted of four gas wells one of which was fair, and a report of a dry hole.

The best completion in the Eastern fields was the test of the Henderson Oil Co. on the T. H. Bee, Jr., farm in Curtis district, Roane County. It was completed in the Salt sand and is rated good for 2,000,000 feet of gas a day. The Salt sand is approximately 1,760 feet deep in this section. In the active Calhoun County, the Warner Drilling Co. completed a test on the J. L. Evans farm in Lee district in the Injun sand at a depth of 2,266 feet. It is showing for a small gas well.

In Cabell County, C. C. Wolfe completed his test on the J. S. Stanley farm in Guyandotte district at a depth of 3,267 feet, the Berea sand. It has been gauged at slightly in excess of 250,000 feet a day.

In Fayette County, the Montgomery Gas Co. completed a test on the New River Coal Co. property in Kanawha district at a depth of 2,878 feet. It proved to be a dry hole. In Nichols County, the Hamilton Gas Co. drilled No. 33 on the Craig heirs' farm in Hamilton district. It was completed in the Big lime at 4,347 feet and will make a small gas well.

Drilling in West Virginia

In Lincoln County, there are three wells drilling but at present two of them are in trouble. In Jefferson district, the Parsner Gas Co. has started drilling on the A. and E. Elkins farm and has passed the 300-foot level. In the same district, the Cambridge Gas Co. is fishing for the tools on the A. M. Mullens farm after having reached 1,765 feet. In Sheridan district, H. H. Dial also has a fishing job on the Claude Peyton farm at 1,900 feet. In the same district, the Kanawha Gas & Utilities Co. has a location ready for a second test on the Nona Johnson farm, and in Carroll district, the same company has a location cleared for No. 3 on the W. W. Carroll farm.

In Mingo County, the United Fuel Gas Co. has two wells drilling. In Hardee district, its No. 4,331 has reached 4,460 feet on the Cotiga Development Co. tract, and in Warfield district, No. 4,329 on the Central Trust Co. property is drilling at 3,050 feet.

In Wetzel County, the Pittsburgh & West Virginia Gas Co. has reached 2,200 feet in No. 5,403, on the J. P. Ashcraft farm in Grant district. The Pittsburgh Coal was found at 1,204 feet in

(Continued on Page 61)

The Design of Gasoline Pipe Lines

Hazen and Williams Formula, as Revised, Gives Accurate Results for Gasoline Friction Flow. Average Value of "c" 130

By Stanley Learned, Engineer, Phillips Petroleum Co.
Presented before Mid-Continent Section, A.S.M.E., Tulsa, March 10.

In the past two years, over 4,000 miles of pipe lines, ranging in size from 3 inch to 8 inch, have been constructed for the transportation of gasoline from refineries to the centers of population where large quantities of motor fuel are consumed. The economic conditions affecting the production, refining and transportation of gasoline have led many, who are in close contact with costs, to predict the building of many more miles of gasoline pipe lines in the next few years.

Particularly by those companies who have constructed gasoline pipe lines, there has been much thought and study with reference to the friction of gasoline flow—but very little has been published on this very important phase of pipe line design. It is the purpose of this paper to present some ideas and suggestions and to develop some curves and charts which will be of help in the designing of gasoline pipe lines.

Correct Hydraulic Design

In as much as:

1. Selection of operating pressures, pipe sizes and thicknesses
2. Location and spacing of stations
3. Selection of pumping equipment
4. Selection of motive power in type and size are all dependent on knowledge of line friction, one can immediately see the necessity for reasonably accurate knowledge of fluid flow characteristics. Before proceeding to the short cuts of solution, let us trace a little of the history of our knowledge of pipe line friction in general and then more particularly of the pipe line flow of petroleum products.

Hydraulics is not an exact science, but is essentially an engineering science. Hydraulics may well be considered as a science with a theoretical background and an experimental superstructure. Our present knowledge of fluid friction has been derived entirely through experimental investigation. The application of hydraulics to any problem involves the use of judgment and experience, as well as mathematics and mechanics.

Regardless of the formulas selected, the accuracy of the final result depends entirely upon the selection of the correct friction factors for the formula used. Before selecting a formula for gasoline flow problems, let us review the development of the fundamental pipe line equation.

We have found that there are certain general laws which appear to govern fluid flow in pipes. These conclusions are as follows:

1. Frictional resistance is independent of the pressure within the pipe, other things being equal.
2. Frictional resistance increases with the roughness of the pipe or conduit.
3. Frictional resistance is directly proportional to the wetted area, or for pipes the length.
4. The retarding influence of viscosity becomes less as the pipe becomes larger.
5. Frictional resistance varies directly as some power of the velocity.
6. Frictional resistance increases with viscosity.

These laws or conclusions may be represented as a formula, as follows:

Let us represent (1) Frictional resistance by h_f.

(2) The effect of roughness and of viscosity by f.

(3) The length by l.

(4) The effect of the pipe size by d^m.

(5) The effect of velocity by v^n.

We may then write the general formula for the flow of liquids in pipes,

$$h_f = \frac{f\, l\, v^n}{d^m}$$

(Continued on Next Page)

FIGURE 1

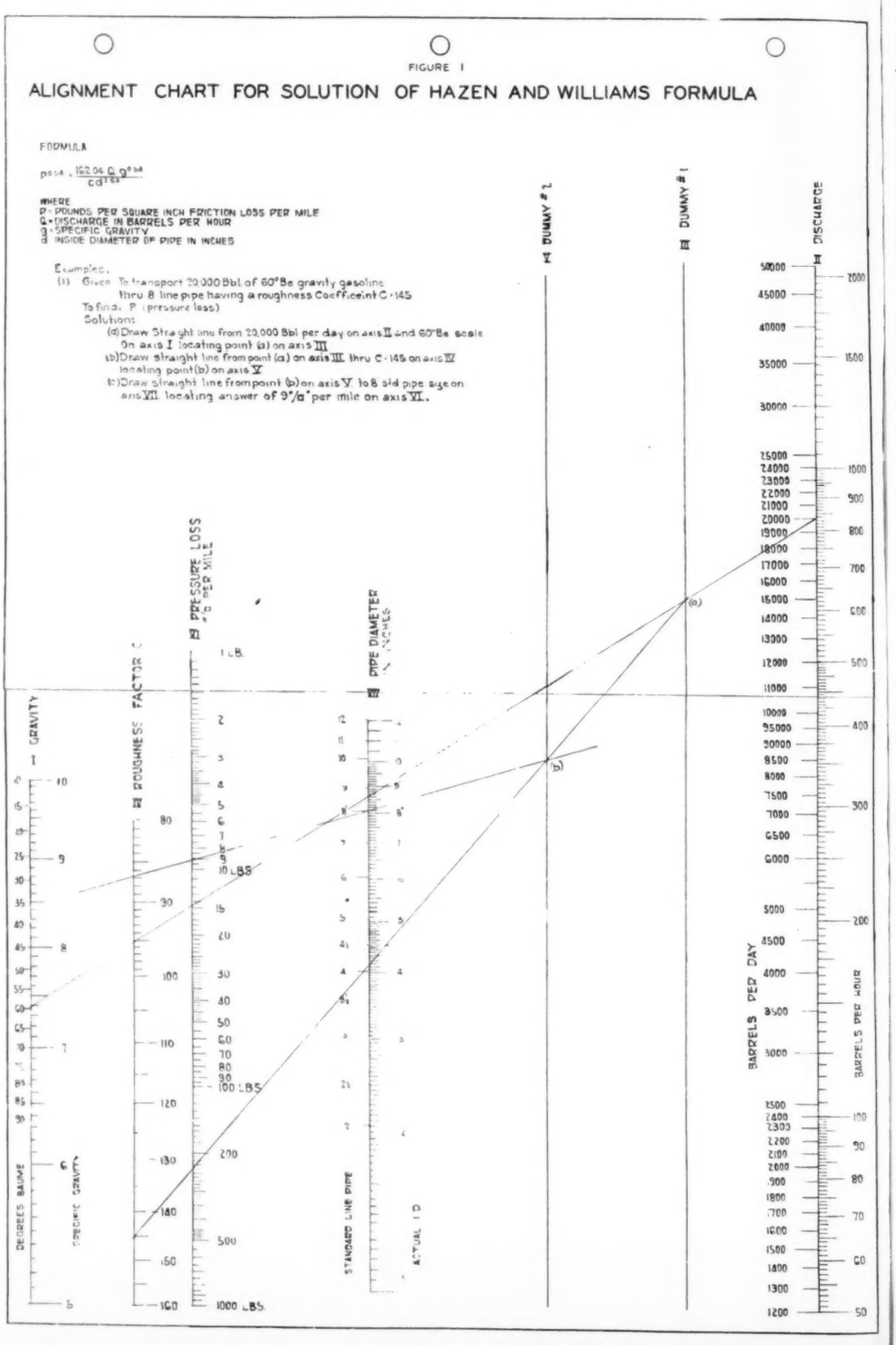
ALIGNMENT CHART FOR SOLUTION OF HAZEN AND WILLIAMS FORMULA

FORMULA

$$p = \frac{162.04\, Q\, g^{0.54}}{c d^{2.63}}$$

WHERE
P = POUNDS PER SQUARE INCH FRICTION LOSS PER MILE
Q = DISCHARGE IN BARRELS PER HOUR
g = SPECIFIC GRAVITY
d = INSIDE DIAMETER OF PIPE IN INCHES

Examples.
(1) Given To transport 20,000 Bbl. of 60°Be gravity gasoline thru 8 line pipe having a roughness Coefficient C = 145
To find:- P (pressure loss)
Solution:
(a) Draw Straight line from 20,000 Bbl per day on axis II and 60°Be scale On axis I locating point (a) on axis III
(b) Draw straight line from point (a) on axis III thru C = 145 on axis IV locating point (b) on axis V
(c) Draw straight line from point (b) on axis V to 8 std pipe size on axis VII locating answer of 9"/a" per mile on axis VI.



This COMPANY SAYS: "LINDEWELD on all future construction"

AFTER Lindewelding a 35-mile trial section of 16-in. pipe and giving it harder tests than ever would occur in service, an important California gas company has stated that all future pipe lines will be Lindewelded.

The strength of Lindewelded joints has been amply proved. Their low cost is easy to demonstrate. Lindewelding is cheaper because it enables a welder to make a joint in 30 to 60 per cent. less time and with 35 to 40 per cent. less welding material.

Lindewelding can be done with ordinary blowpipes or with special apparatus which makes the welding almost automatic and further increases its speed. Experienced welders quickly adapt themselves to this new method of oxy-acetylene welding, and beginners learn it readily.

Procedure Controls for Lindewelding are available to all users of Linde Oxygen. Let our nearest district office show you how Lindewelding can save time and money on your next pipe line job.

Study Lindewelding Technique in this Motion Picture

Our motion picture, "The Lindeweld Process for Pipe Line Construction," shows every detail of Lindewelding technique, which differs from neutral flame welding technique in that it employs a special rod, a special flame adjustment, and the "backhand" method of blowpipe manipulation. It reveals the actual steps in making a Lindewelded joint. Pipe line officials and welding or engineering societies may borrow this picture free of charge by writing to any Linde District Office. It is furnished in 16 mm. and 35 mm. safety film.

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Unit of Union Carbide and Carbon Corporation

126 Producing Plants UCC 627 Warehouse Stocks

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It is from this generalization that all specific formulas for the calculation of friction in pipe lines have been developed. Regardless of the formula selected, the accuracy of the results depends entirely upon the selection of the proper friction factors (f) for the formula used.

Solution of Friction Problems

In as much as the gasoline lines were built by oil companies whose engineers had been designing oil lines, the natural tendency was to adapt the oil design formulas to design the gasoline lines. In as much as this paper is recommending a method of design for gasoline lines radically different than that used for crude design, let us consider first, the necessity for the crude line friction method, and second, the difference between oil and gasoline that make other methods desirable for gasoline.

As early as 1883, Prof. Osborne Reynolds determined that there were two types of flow, i.e., streamline and turbulent. He further determined that there was a range in which nothing but streamline flow could exist and that there was another range in which nothing but turbulent flow could exist. He proved that the type of flow to exist depended upon a ratio of

$$\frac{Dvs}{u}$$

where

D=diameter of pipe in feet.

v=velocity of fluid in feet per second.

s=density of fluid in pounds per cubic foot.

u=absolute viscosity in foot-poundal-second system.

At small values of

$$\frac{Dvs}{u}$$

the flow was streamline. At values of from 2,000 to 2,500, the flow changed to turbulent. Later, experimenters found a further use for this Reynolds number. They found that there was a distinct relation between the Reynolds number and the factor "f" in the modified Darcy formulas. After numerous experiments, curves have been prepared, showing the relationship between the friction factor and the Reynolds numbers. In general, all crude line problems are solved from the Darcy formula

$$(h_f = \frac{f\,l\,v^2}{2gd})$$

determining the friction factor f after the calculation of the Reynolds number. This method has been extremely well-adapted for calculating friction losses in oil pipe lines.

Many people have the erroneous idea that friction losses calculated by the above mentioned methods give exact results, when, in reality, they are only as correct as the curve for f. This has gone so far that one writer in the trade journals in discussing gasoline pipe line friction in which the oil line method was recommended, says, "After the ratio of

$$\frac{Dvs}{u}$$

is calculated, the value is taken to the curve and the coefficient of friction for the given condition is found. Thus, there is no assumption made for determining the coefficient of friction." The above statement is, no doubt, true as far as the writer of the paper was concerned, for someone else had done his assuming in preparing a recommended curve for f at different values of the Reynolds number.

To further remove this idea that results calculated from an f determined by the Reynolds number will be exact, let us consider the effect of variation in accuracy of the determination of f. f is normally in a range of values between .020 and .040. Please note that an error in selection, of only .002, will mean

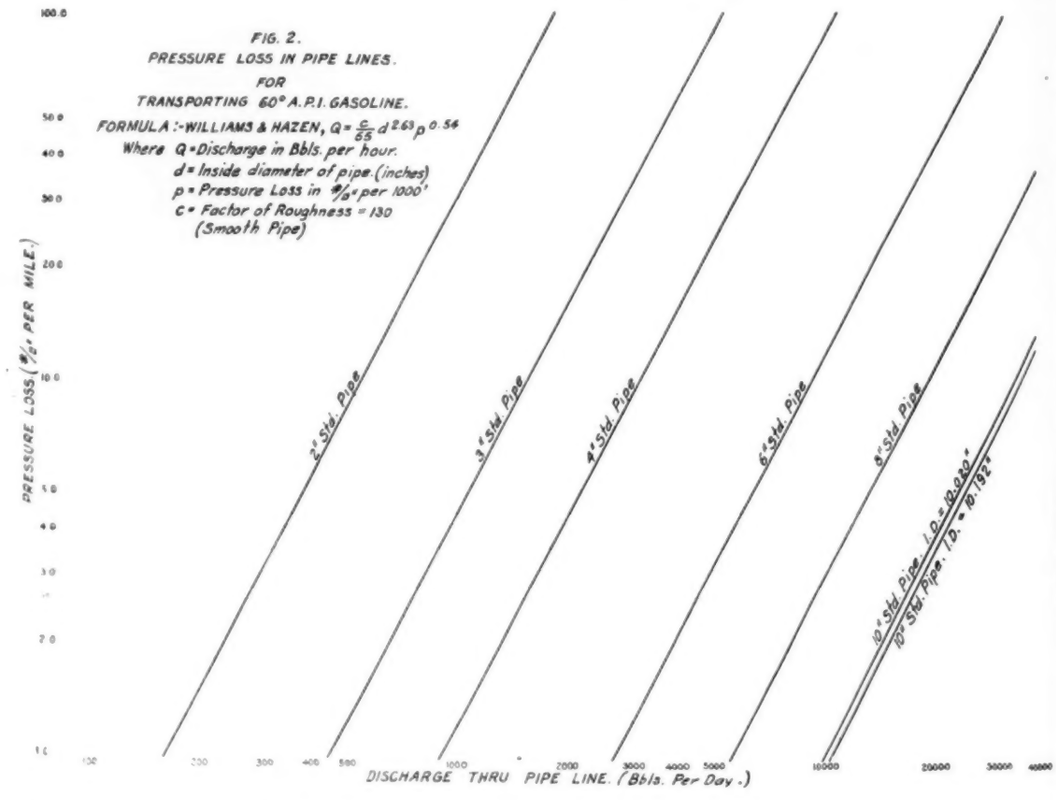


TABLE 1—STUDY OF VALUES OF CONSTANT "C" IN HAZEN-WILLIAMS FORMULA FOR FLOW OF FLUIDS, WHICH ARE OBTAINED FROM ACTUAL OPERATING DATA OF AN 8-INCH WELDED STEEL LINE CARRYING GASOLINE. SECTION OF LINE, LAVERNE TO ATTICA. LENGTH OF SECTION, 103.9 MILES. STATIC DROP, 531 FEET.

(1) Month	(2) Day	(3) Laverne discharge pressure, lbs./sq. in.	(4) Sp. gravity of product at Laverne	(5) Head at Laverne, in feet	(6) Attica intake pressure, lbs./sq. in	(7) Sp. gravity of product at Attica	(8) Head at Attica suction in feet	(9) Total friction loss in feet (5)—(8)÷531′	(10) Friction loss in ft./mile (9)÷103.9	(11) Quantity pumped corrected to 60° F. bbls.	(12) C in H&W formula
September	1	840	.745	2,605	55	.745	171	2,965	28.5	18,762	134
	2	825	.675	2,820	65	.745	202	3,149	30.3	18,494	129
	3	789	.675	2,700	50	.745	155	3,076	29.6	18,673	131
	4	750	.745	2,320	40	.675	137	2,714	26.1	18,002	135
	5	830	.745	2,570	50	.675	171	2,930	28.2	19,015	138
	6	830	.745	2,570	125	745	390	2,711	26.1	18,344	137
	7	830	.673	2,905	35	.745	109	3,327	32.0	18,894	127
	8	825	.675	2,820	45	.745	140	3,211	30.9	18,804	130
	9	840	.675	2,870	45	.675	154	3,247	31.3	18,743	127
	10	825	.745	2,560	35	.675	120	2,149	20.7	18,517	159
	11	840	.745	2,605	50	.675	171	2,965	28.5	18,480	133
	12	844	.745	2,610	35	.745	109	3,032	29.2	18,410	131
	13	840	.745	2,605	30	.745	93	3,043	29.3	18,963	134
	14	835	.675	2,860	30	.745	93	3,298	31.7	19,002	139
	15	830	.675	2,840	35	.745	109	3,262	31.4	18,738	127
	16	835	.675	2,850	45	675	154	3,227	31.3	18,822	128
	17	855	.675	2,920	30	.675	162	3,349	32.2	19,127	128
	18	880	.675	3,010	35	.675	120	3,421	33.0	18,767	124
	19	885	.675	3,020	30	.675	103	3,448	33.2	18,902	124
	20	880	.745	2,720	60	.675	205	3,046	29.3	18,145	129
	21	895	.745	2,780	55	.675	187	3,124	30.1	17,718	123
	25	895	.65	3,180	80	.745	248	3,463	33.3	18,140	120
	30	540	.745	1,670	140	.65	498	1,703	16.4	14,442	138

TABLE 2—STUDY OF VALUES OF CONSTANT "C" IN HAZEN-WILLIAMS FORMULA FOR FLOW OF FLUIDS, WHICH ARE OBTAINED FROM ACTUAL OPERATING DATA ON AN 8-INCH WELDED STEEL LINE CARRYING GASOLINE, SECTION OF LINE, BORGER TO LAVERNE, LENGTH OF SECTION, 109.9 MILES, STATIC DROP 717 FEET

(1) Month	(2) Day	(3) Borger discharge pressure lbs./sq. in.	(4) Sp. gravity of product at Borger	(5) Head at Borger in feet	(6) Laverne intake pressure lbs./sq. in.	(7) Sp. gravity of product at Laverne	(8) Head at Laverne, suct. in feet	(9) Total friction loss in feet (5)−(8)÷717′	(10) Friction loss in ft./mile (9)÷109.9	(11) Quantity pumped corrected to 60°F.-bbls.	(12) C in H & W formula
September	1	840	.675	2,870	85	745	273	3,314	30.2	18,762	130
	4	850	.745	2,640	80	745	186	3,171	28.8	18,001	129
	5	872	.745	2,700	50	745	155	3,262	29.7	19,014	134
	6	850	675	2,903	95	745	295	3,327	30.3	18,344	128
	7	845	675	2,890	48	.675	164	3,443	31.4	18,893	128 5
	8	850	.675	2,905	59	.675	202	3,420	31.1	18,804	128 5
	9	855	.745	2,650	33	675	113	3,254	29.6	18,743	122
	10	850	.745	2,640	94	.745	292	3,065	27.9	18,517	135
	11	850	745	2,640	25	745	77	3,280	29.8	18,480	130
	12	850	.745	2,640	20	.745	62	3,295	30.0	18,410	129
	13	850	675	2,903	32	745	108	3,514	32.0	18,963	128
	14	850	.675	2,905	30	.675	102	3,520	32.0	19,002	129
	15	850	675	2,905	35	.675	120	3,502	31 9	18,738	127
	16	850	675	2,905	35	675	120	3,502	31 9	18,821	128
	17	850	675	2,905	50	675	171	3,451	31 4	19,127	130
	18	850	675	2,905	75	675	256	3,368	30.6	18,767	130
	19	850	745	2,640	85	675	291	3,068	27 9	18,903	127
	20	800	745	2,480	75	745	233	2,964	27.0	18,146	127
	21	846	.745	2,625	179	.745	555	2,787	25.4	17,718	135
	22	620	65	2,200	213	.745	660	2,257	20.5	16,368	139
	23	500	65	1,775	80	.745	248	2,244	20 4	16,189	138
	25	675	745	2,090	40	65	142	2,665	24.2	15,140	143
	30	450	.745	1,395	100	745	310	1,862	16.4	14,412	138

an error in the final result of from 5 to 10 per cent, depending on the value of f. This mention of the possible inaccuracies of the crude oil method is not made to be derogatory of that method, but is made to clear the way for a recommendation for gasoline lines of another method, which, to the writer, is simpler to use and is at least as accurate as the methods used for crude oil pipe line design.

Formula for Gasoline Line

It would appear that the selection of a formula would be governed by:

1. A formula whose exponents are such that one series of friction factors will meet all conditions.
2. A formula which is in a form for easy solution.
3. A formula which involves knowledge of the product which is being pumped which is easily obtainable.

The crude line method was not particularly interesting because it required the knowledge of gasoline viscosity. Methods for the determination of gasoline viscosity are not readily obtainable. Consequently, we were led away from the formulas which referred to viscosity. Although there is not a great deal published about the viscosity of gasoline, such information as is available shows the values low and close to the values of water, so we were led to consider the formulas for flow of water in pipes.

The solution of water friction problems is generally made with the Chezy formula. This formula is hard to use because its friction factor depends upon the roughness of the pipe and also upon the hydraulic radius and the slope. About 1902, Hazen and Williams developed their formula, using exponents for the hydraulic radius and the hydraulic slope, which represented, "as nearly as possible the average conditions, as deduced from the best available records of experiments upon the flow of water." In this way, "the value of c for a given condition of surface will vary so little as to be practically constant." Naturally, this formula will not give exact results, but in as much as the Shell Oil Co. of California had used this method in the design of its 100-mile line, we were led to consider it quite seriously. A comparison of friction losses on numerous lines of our own and of lines on the Pacific Coast further verified the use of this formula.

The Hazen and Williams formula, as originally recommended, is:

$$v = c\, r^{0.63}\, s^{0.54}\, .001^{-0.04}$$

Where v = velocity in feet per second.
s = slope,
r = hydraulic radius in feet, and
c = constant.

By introducing the specific gravity of the liquid and converting the values, we arrive at an equation:

$$Q = \frac{c\, d^{2.63}\, I^{0.54}}{6.75\, g^{0.54}}$$

Q = capacity, barrels per day.
Where d = I. D. in inches.
P = pressure loss in pounds/square inch per mile.
g = specific gravity of gasoline.

This formula has fulfilled the three requirements given above, except that it is not in a form for easy solution because of the exponents used. This objection was eliminated by the preparation of an alignment chart for its solution, which is shown in Figure 1.

Solution of Gasoline Formula

There are several advantages to alignment chart solutions, which are particularly worth while in this application:

1. Scales, once placed and properly located, may be made to read in as many different ways as desired, such as:
   (a) Discharge scale in barrels per day, barrels per hour, or gallons per minute.
   (b) Gravity scale in specific gravity, and Baume scale.
   (c) Pipe diameter in actual I.D., and nominal pipe size.
2. Chart covering large range conditions is placed on one sheet.
3. Solved by drawing straight lines.
4. Solution for any unknown is easy.

The selection of the value of c to be used for this formula is the next question. Our original ideas, based on results of short lines of new pipes, led to the use of a value of c = 130. Later tests on longer lines, conducted at warm temperatures, led us to a higher value of c up to c = 140. Suggested values of c and the factors affecting c will be mentioned more completely later.

Numerous problems arise wherein solution by use of the alignment chart becomes bunglesome, such as the condition when one is to pump gasoline of a definite specific gravity (.75) and with pipe whose friction coefficient is known, say c = 130. Such a condition can better be handled by a plotting on double logarithmic paper so that the friction loss for any size pipe may be expressed as a straight line, when the abscissas represent barrels per day and the ordinates represent loss in pounds/square inch per mile (See Figure 2).

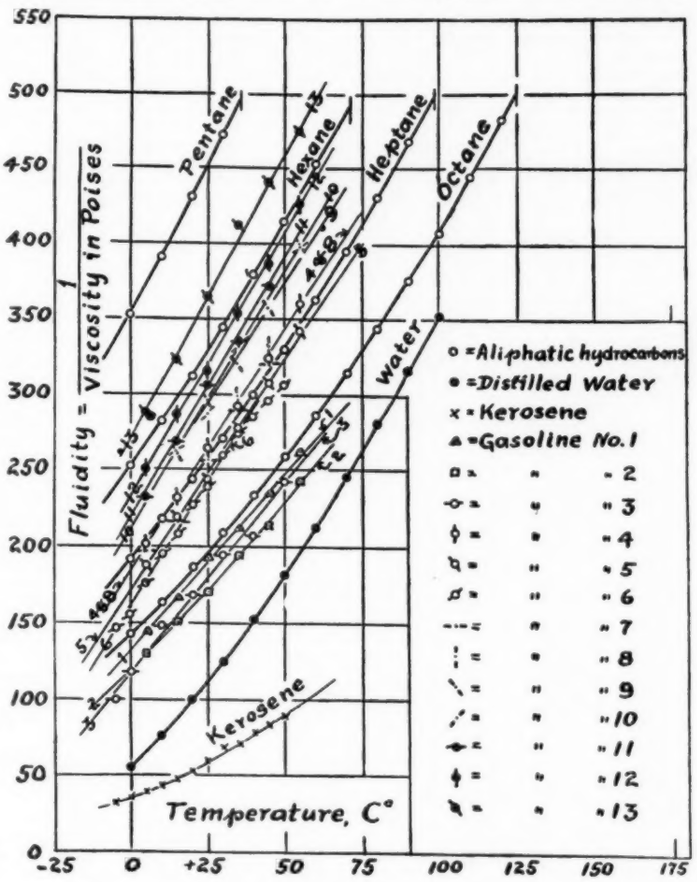


FIG. 3 —*Temperature-fluidity curves of gasolines and other liquids*

In as much as there was little published on the viscosity of gasoline and of its variation with temperatures, we, in our early investigations, did not attempt to chart the flow conditions for winter and summer, but only for the year's average. It so happens that the peak demand for gasoline is in the summer months, when the line has its greatest capacity so it was of no particular consideration.

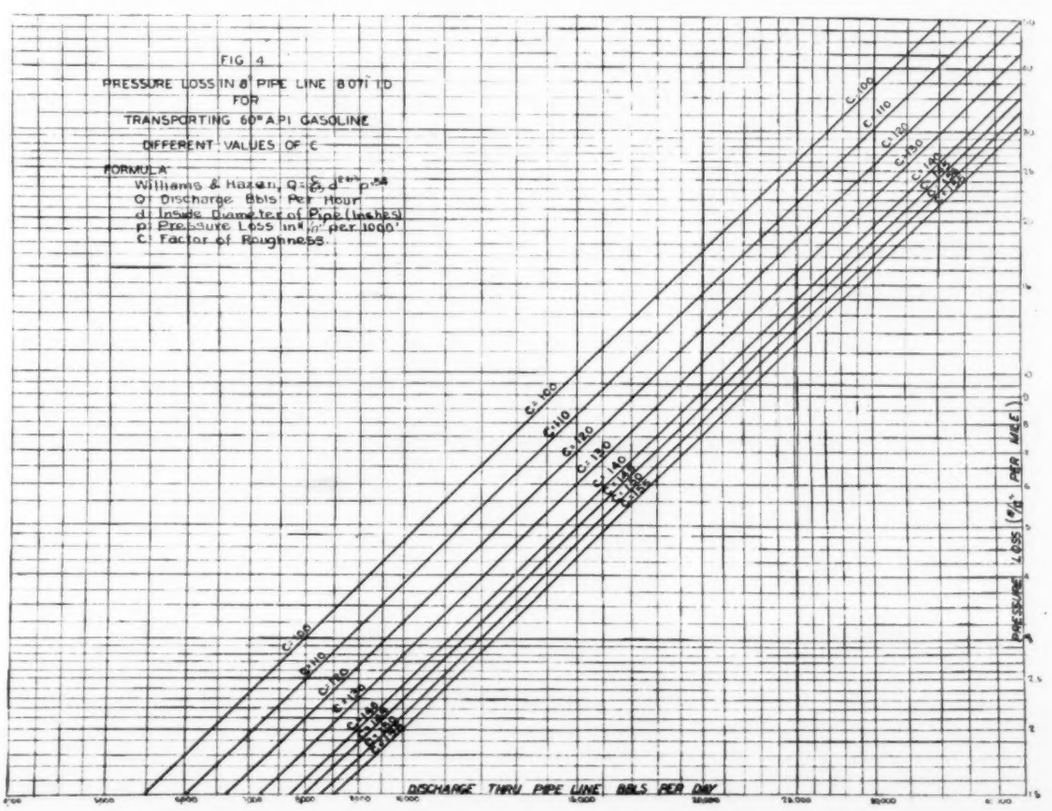
However, it is necessary to know the line capacity for each month in order to estimate shipments, earnings, etc. This involved a study into the effect of temperature upon friction. Figure 3 is a chart showing the variation of the fluidity (the reciprocal of the absolute viscosity in poises) of certain gasolines and pure hydrocarbons at different temperatures (from Bureau of Standards, Technological Paper No. 125). You will note that there is a large variation of viscosity within the range of temperature from 30 to 80° F., which is the approximate range of pipe line flow temperatures.

Suggested values of c for different temperatures will be given later, but for easy calculation of specific problems, we submit Figure 4, which shows variation of capacity of 8-inch pipe line, handling .75 specific gravity gasoline at different pressures with varying values for c.

Study of the Values for c in Hazen and Williams Formula

In order that we might have better information on friction of gasoline, we have kept a daily record of the operations of Phillips Pipe Line Co.; and, recently, another pipe line company gave us access to its records for checking. From these data, we have been able to reach some fairly accurate and positive results. As further data from other operators of gasoline lines is made available, further conclusions can be reached.

From actual daily pumpings, we get more nearly the results to be expected in actual operation than can possibly be obtained by any special tests which are made under ideal conditions after care-



ful preparation. In other words, it would seem that the friction factor we desire is one which we will get in every day operation and not one obtained by very carefully prepared and conducted tests.

Tables 1 and 2 show typical operating data and calculations. Data similar to that shown in these tables have been kept and calculated since the start of operations of Phillips Pipe Line Co. After almost a year of operation, we have found, for our main system of 8-inch electric weld pipe, a value of c for average of 130. A check of the operations of another large gasoline pipe line with seamless pipe has shown average value of c slightly less than 130. The data are not complete enough to make any recommendations at this time for differing values c for different pipes.

It appears also that the values of c for smaller size pipes than 8-inch are slightly higher than those for 8-inch pipe. If sufficient information can be obtained, we believe that we can arrive at a small change in the exponents in the Hazen and Williams formula, so that values of c will be constant for varying sizes of pipe.

We gave no particular thought to the variation of line capacity with temperature until this winter, when we found a considerably smaller line capacity than we had had in summer months. In as much as we had not expected quite as large a seasonal variation, we investigated more carefully the results we were obtaining and compared these with viscosity curves. We found that our variation in capacity followed a straight line curve similar to the curves shown in Figure 3 for gasoline fluidity. Further comparison of results has led us to the conclusions reported herein.

Conclusions and Recommendations

1. The Hazen and Williams formula, as revised, presents an easily solvable formula, which will give accurate results for gasoline friction flow.

2. Based on present information, the value of c, for new pipe, is approximately 130 for average year around conditions of northern Texas, Oklahoma, Kansas, Missouri and Illinois (temperature average of 50°).

3. Although more complete knowledge of the variation of gasoline viscosity with temperature and the corresponding variation of c is needed, it would appear that for smooth pipe c increases or decreases about three-fourths for every degree Fahrenheit rise or fall in temperature from 50°. In other words, at 70° flowing temperature, c = 145, and at 30° flowing temperature, c = 115.

4. There appears to be a slight variation in values of c for different size pipes, i.e., values of c for smaller pipes are slightly greater than those recommended herein.

The writer believes that it is quite possible that a small change in the exponents of the hydraulic slope and the diameter will correct this apparent defect in the formula. As more actual operating data becomes available, this will be carefully checked.

5. Further and more complete information on this subject can be obtained if such data as shown in Tables 1 and 2, Columns 1 to 7, inclusive, and, in addition, a column for flowing temperature, can be obtained from other companies operating gasoline lines. The writer will welcome the receipt of such information in order that more complete data on this subject may be presented at a later date.

6. The values of c for (1) Varying temperatures or viscosities; (2) varying types of pipes, can be checked with the information obtainable from the companies operating gasoline pipe lines.

Acknowledgments

The writer wishes to acknowledge the suggestions and assistance of A. H. Riney, chief engineer of Phillips Pipe Line Co.; A. W. Hubbell, superintendent of Phillips Pipe Line Co.; and L. T. Gibbs and M. O. Johnson, of the engineering department of Phillips Petroleum Co.

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Under Water Tunnel for Pipe Lines

Discussion of Methods Used in Construction of Shafts and Bore Beneath Houston Ship Channel for Stream Crossing

By Frank Hadley, Sinclair Texas Pipe Line Co.
Presented before Mid-Continent Section, A.S.M.E., Tulsa, March 10.

When it was decided the Sinclair Texas Pipe Line Co. should lay a pipe line into Sinco refinery, the biggest problem was laying this line across the Houston Ship Channel.

For those who may not know, the Houston Ship Channel is a deep waterway for ocean-going vessels to come into the city of Houston. This has been made by dredging from the Gulf of Mexico at Galveston, about 50 miles southeast of Houston, through the Gulf of Galveston, then up Buffalo Bayou the last 20 miles into Houston. This latter part is more generally known as Houston Ship Channel because of its narrowness.

This channel is under the control of the War Department and the operation of traffic within Harris County, is governed and regulated by the Port Commission of the Fort of Houston. Hence authority for crossing must be obtained from the director of port, and permit for crossing, granted by the War Department.

All former pipe lines had been laid on the bottom of the channel after dredging had been done to meet the requirements of the War Department. These called for a clear channel 30 feet deep and 150 feet wide on the bottom, in 1920, but in 1931, it was a channel 45 feet deep and 350 feet wide on the bottom. The cost of dredging to meet these requirements was investigated, the location of crossing carefully considered, especially since the desired location was near existing lines, and the outlet on opposite bank being outside property probably requiring outright purchase. The amount of excavating necessary, the disposal of same, the distance to such disposal and the excessive excavation due to quicksand conditions, were just as carefully considered.

North shaft of the Sinclair-Texas Pipe Line Co. pipe line tunnel under Houston Shipping Channel.

Preliminary Work

While dredging was being considered, the proposition and feasibility of a tunnel was just as thoroughly investigated. The first inquiries as to the nature of subsurface soils were very discouraging and even ridiculed, but encouragement was revived when an old well driller was found who gave better reports on the soil at depths from 75 to 100 feet. To verify this he was employed to drill some test holes and take cores of the different soils. One test was made on the south bank, then one on the north and as they checked very closely further tests were left to contractor if desired.

Core tests showed as follows: (Readings are elevations above or below mean low tide.)

	Feet
Mostly sand to	—44
Tough red clay from	—44 to —74
Blue clay	—74 to —82

Under these encouraging tests and samples of soil, plans and specifications for tunnel were drawn, the principal points as follows:

A vertical concrete shaft on each bank, inside diameter 10 feet, outside diameter 13 feet, hence 18-inch wall, reinforced.

A concrete tunnel connecting these shafts, tunnel to be an inverted U shape, flat bottom, inside width and heighth 8 feet, with a 12-inch wall.

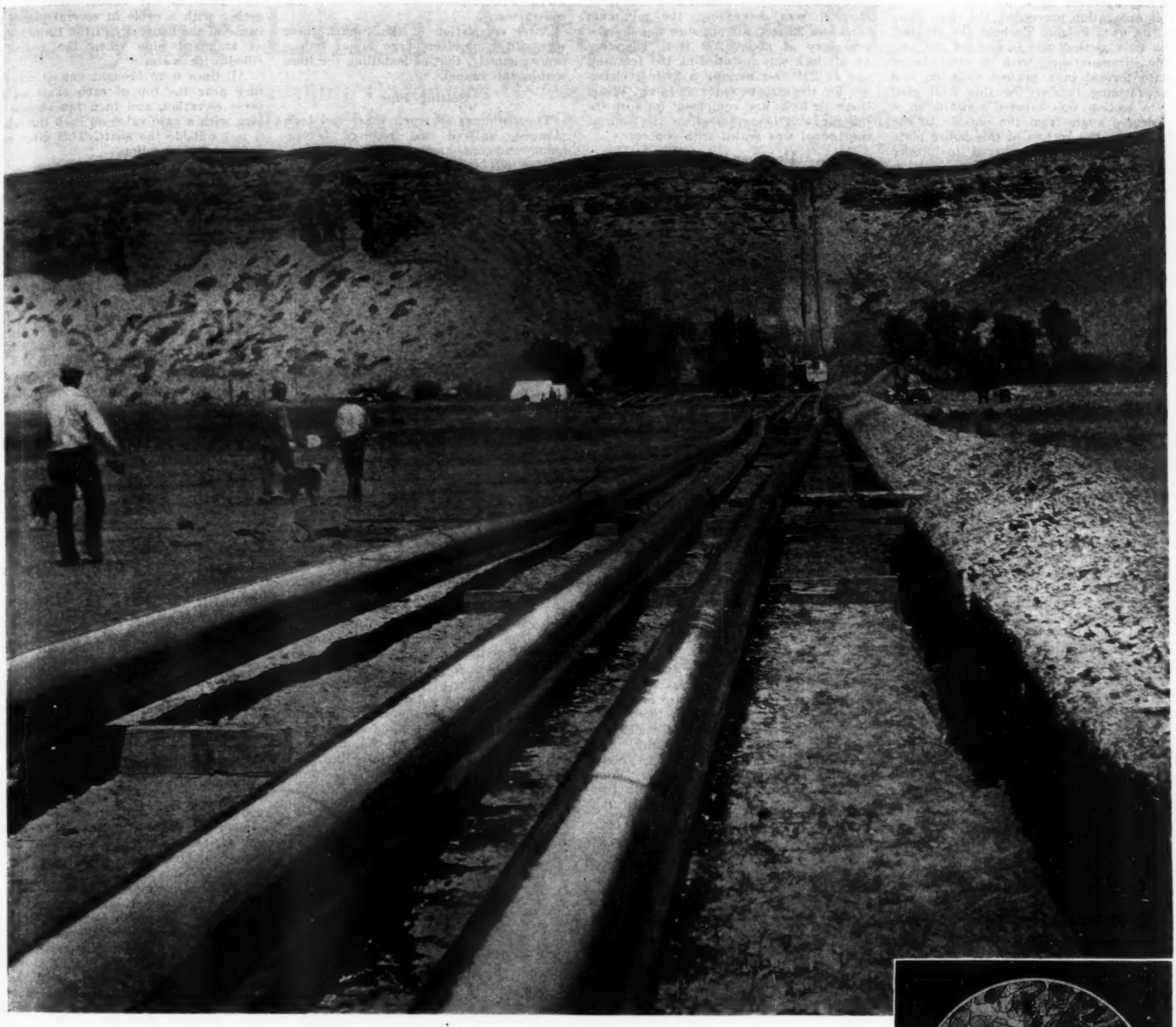
A ladder and channel irons in each shaft and concrete inserts in tunnel where desired.

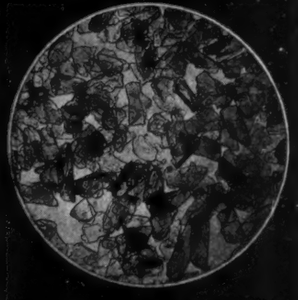
In order to consider tunnel price with drdeging, plans and specifications were given to contractors for bids. The specifications called for a lump sum bid for tunnel and shafts of definite length as drawn, but if a longer or shorter shaft or tunnel became necessary, then a price per foot of shaft or tunnel was to be added or deducted accordingly. Also if reinforcement in tunnel was necessary, bid to be a price per pound in place. If cribbing was necessary a definite price per 1,000 board feet in place. And if necessary to work under compressed air a lump sum bid for this was asked.

After tunnel bids were received, and considered with dredging estimates, and the advantages and disadvantages of each were carefully weighed, the tunnel was decided upon and contract let to the Subway Engineering Co., of Chicago, who proceeded to get tools and equipment upon the job at once, and started the south shaft June 1, 1931.

Work Started

The concrete shafts were built above the surface of the ground in 2-foot sections, and excavation within the shaft





This reproduction of a photomicrograph shows the interlocking of the flakes of the internal reinforcement used by Barrett. By laminating with the waterproofing agent they give Barrett Pipe Line Enamels unusual tensile strength and toughness.

For pipe of large diameter The Barrett Company will furnish equipment required to revolve pipe and spread enamel.

More coal tar pitch . . . because less re-inforcements needed in

Barrett Specification PIPE LINE ENAMELS

TO the specially treated coal tar pitch, the base of Barrett Specification Pipe Line Enamels, is added a plate-like *mineral* reinforcement. Its flaky mineral particles, when combined with pitch, laminate and inter-lock to give unusual tensile strength and toughness. Its type and structure make less of it necessary to retain the natural flow of the pitch around the pipe surfaces and also to withstand underground stresses. This permits the use of more coal tar pitch—the soundest waterproofing agent known. For complete information—or assistance—phone, write or wire.

The Barrett Company

40 Rector Street, New York

was done by hand, or with a clam shell bucket operated by a wooden boom. As this excavation proceeded, the shaft sank of its own weight. To help the sinking, the first section was formed on the outside circumference with a steel boiler plate formed in a perfect cylinder, and the forming lumber for this first concrete section was tapered upward on a 45-degree angle from the outside to the inside. On the bottom of this boiler plate a 4"x4" angle iron, curved to proper radius, was riveted to make a cutting edge for the shaft. As these 2-foot sections of concrete were built one on top of the other, and as the sand or soil within was excavated, the shaft sank readily. The forming lumber, which was made up in sections, was easily put together and removed. The forms were generally taken off in one or two days after concrete was poured, as a quick setting cement was used on 50-50 mix with portland cement.

The sinking of the shaft progressed rapidly at the start but slowed up as the depth increased, due to slow excavation through several feet of water in the shaft as long as quicksand was encountered.

Sealing Off Water

A difficult job was the sealing off of water when the clay soil was encountered. This trouble increased when a few scattering sand rocks got under the cutting edge of the shaft, but this sealing off was finally accomplished by pouring 2 feet of concrete in the bottom of the tunnel. After this concrete set sufficiently, the water was pumped out, holes cut through shaft and grout pipes inserted and the outside of the shaft thoroughly grouted under 100 pounds pressure; until the grout showed up on surface outside of shaft. After this was completed, the concerete in the bottom was cut out and underreaming of shaft started. The remainder of the shaft was completed by concreting in 1 and 2-foot sections underneath the cutting shoe as excavation continued downward, until suitable soil for the tunnel location was decided upon, which was at —66 feet for the tunnel floor.

During the time the south shaft was constructed, the north shaft was started and carried to completion three weeks before the south shaft. No difficulty was experienced in the north shaft in sealing off the water when clay was encountered and the sinking of the shaft finally stopped with cutting shoe at —62 feet. After which underreaming and concreting downward was continued, until an underground vein of water was struck at —79 feet which made it necessary to seal the bottom with concrete, and because of this water vein, the tunnel was started and completed from the south shaft.

Tunneling

As soon as the tunnel was started, it was discovered cribbing was necessary on account of slack nature of the shaly red clay, when exposed to the air. This cribbing was made of 3"x6" in five pieces, two pieces 6 feet long and three pieces 4 feet long formed in an arch, and large enough to leave a minimum of 12 inches outside of the regular steel forms which form the inside of the tunnel. The concrete was poured between the inside form and the cribbing, the floor being poured first, then sides poured upward from the bottom and then the top was rammed in from the front.

Excavation in the tunnel was done by compressed air spades, and removal of the earth was hauled out in small cars. Excavation was extended ahead of concrete work in this tunnel about 10 to 12 feet, a day's work, because of cribbing; but in other tunnels of this size where soil is of such nature cribbing is not required, then 3-foot to 6-foot sections is about the limit.

To be prepared for unseen conditions, air locks for the tunnel were ordered and received before the work was started and at 38 feet and 56 feet from center of the south shaft slots were left in the concrete for installing these air locks on short notice if necessary. Because water seepage kept increasing, and depth of soil between top of tunnel and bottom of channel was decreasing, the minimum thickness 22 feet, air pressure was deemed necessary at about 250 feet. Therefore an air lock was installed at 194 feet and one at 218 feet making a 24-foot chamber for the men to enter and exit. While these air locks and equipment for furnishing air was being installed, the end of the tunnel was sealed with concrete.

Air Chambers Used

The air for this work was obtained from the Houston Power & Light Co., about 200 yards distant, therefore only necessary to have pressure tanks for carrying this air at 100 pounds and another tank and regulator to reduce to working conditions, which was from 5 to 8 pounds. At this low pressure most any one could enter and work. In fact working conditions were better and cooler under compressed air than before, and greater speed was obtained. The night crew did the digging and the day crew did the concreting and made 12 feet each day. This was continued until the north shaft was struck, tied into, and concreted. After setting several days the north shaft was cut through, and the tunnel was found to be 3 inches off center.

The alignment of the tunnel was produced from two plumb bobs suspended in the south shaft 6 feet apart. These were made with No. 5 piano wire with a 10-pound weight suspended on each wire, and each weight brought to rest in a bucket of water.

The cutting through of the north shaft and installing the ladders and channels in each shaft and concrete pipe supports in the tunnel completed the work of the contractor.

After completion of the tunnel, there was still a problem of no minor importance; namely, that of installing the lines within the tunnel.

Setting Pipe

The buildings for each shaft had been planned, ordered and received beforehand, and one erected before the contractor left the job. Each was a steel frame strong enough for hoisting pipe and materials in and out of the tunnel, and each closed in with galvanized corrugated iron. The north building was a square low type with ventilator, and the south one tall pyramid shape with a lean-to offset to the north for locating a motor and winch to one side of, and clear of the shaft. This 5-horsepower motor and winch operated as a hoist over a pulley located in the top of the building, for pulling the long joints of pipe into, and through the long door made in sections on the south side. By this means the pipe was lowered to the bottom and placed on two small carts and hauled to any part of the tunnel desired.

There were four 12-inch and four 8-inch pipes laid in the tunnel; two 12-inch on each side on concrete supports, and then an 8-inch above each 12-inch, laid on 2-inch pipe between.

All lines within the tunnel were electric welded, except the tie-in welds near the south shaft, which were acetylene welds, as were all the welds in each shaft.

The right angle turns at the bottom and top of each shaft were made with tube-turns to give the oil an easier flow. The lines in the tunnel were tied together with a cable in several places because of the buoyancy of the 12-inch lines of standard pipe when the tunnel is filled with water.

All lines were brought out on the surface near the top of each shaft on the same elevation, and in a fan shaped design with a gate valve on each line about 6 feet outside the shaft. This gives easy access of connection.

Lines Tested

After lines were completed they were all tested out with water under 800 pounds pressure and remained under this test for 14 hours with very slight drop in pressure. After this test, one 12-inch line was connected, and filled with oil.

When this was done, the tunnel was filled with fresh water, the purpose of which is threefold:

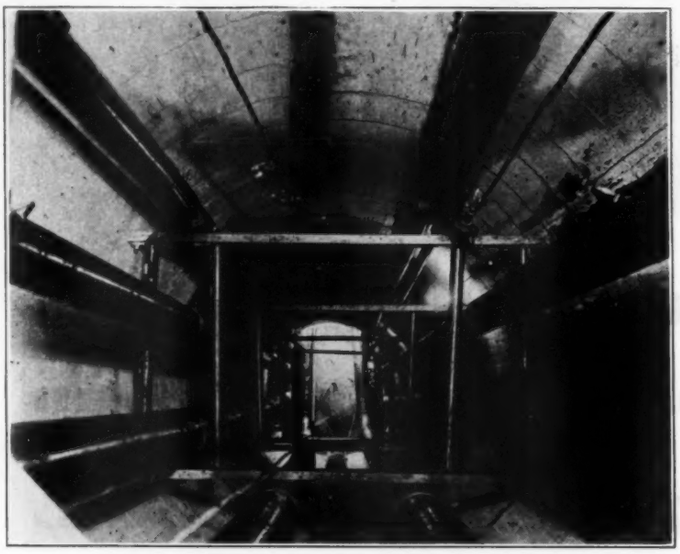
First. The preventing of corrosion, which is excessive in a tunnel due to dampness and more so here because of the briny influx from the Gulf.

Second. To prevent fire or explosion within the tunnel, and serious damage that might result therefrom.

Third. To reduce to a minimum any contraction or expansion in the tunnel.

The construction of the tunnel and the lines therein was completed without a single injury of any importance, and we still believe we made the right choice—a tunnel instead of dredging.

Looking north in the tunnel under the Houston Shipping Channel.



South shaft Sinclair-Texas Pipe Line Co. pipe line tunnel.

EAST TEXAS OIL CLUB UPHOLDS REGULATIONS

TYLER, Tex., Mar. 14.—H. L. Hunt of Tyler was elected permanent chairman and Rade Kangerga of Henderson was named permanent vice chairman of the newly formed East Texas Oil Club.

Under its organization plans, the club is a self-constituted, self-governing body, voluntarily obligating itself to abide by antiwaste regulations of the Railroad Commission and assist in that enforcement.

A committee of 21 signers of the agreement was designated to serve as administrators of the club's affairs until succeeded by a committee elected by the membership. The committee is composed of: G. O. McCreight, Longview; Rade Kangerga, Henderson; H. L. Hunt, Tyler; Earl Galloway, Dallas; W. A. Wise, Tyler; W. B. Hamilton, Wichita Falls; Ray Laird, Kilgore; Jake Hamon, Gladewater; W. C. Stroube, Corsicana; Ralph Johnson, Tyler; Paul Snetcher, Fort Worth; F. K. Lathrop, Longview; Clifford Mooers, Longview; Arch Rowan, Tyler; Paul Meaders, Tyler; R. W. Fair, Tyler, F. W. Burford, Dallas; Marvin Kelly, Longview; Harry Reynolds, Houston; William McCullough, Tyler, and Maxie Wilson, Overton.

The following members were appointed as a committee on pipe line investigation: J. Harry Reynolds, W. A. Wise, J. W. McCullough, Arch Rowan and Marvin Kelly.

TEXT ON EXCISE TAX

The provisions relating to oil in the new revenue bill as reported to the House at Washington are as follows:

Section 601—(d) In the case of the following articles, the tax imposed by this title shall be at the following rate:

(1) Lubricating oils, of the grades designated (at the time of the enactment of this act) by Society of Automotive Engineers viscosity numbers 20 to 70, inclusive, 4 cents a gallon.

(4) Crude petroleum, fuel oil derived from petroleum, gas oil derived from petroleum, and gasoline, imported into the United States, 1 cent a gallon; but no article described in this paragraph shall be exempt upon importation from tax under this title as an article for further manufacture, and no credit or refund of tax imposed upon the importation of any article described in this paragraph shall be allowed under Section 605(a).

(e) Exemptions under this section of sales or importations shall be allowed or granted upon compliance with the regulations.

Laying Lines Across the Mississippi

Prevailing Conditions Necessitated Employment of Three Different Methods by Prairie, all of Which Are Described

By J. T. English, Superintendent Pipe Line Maintenance, Prairie Pipe Line Co., Northern Division

Presented before Mid-Continent Section, A.S.M.E., Tulsa, March 10.

With a few exceptions, overland pipe lines follow the elementary geometric axiom that a straight line is the shortest distance between two points; and a pipe line, if extended far enough, will sooner or later meet a river, the crossing of such becoming a necessary evil. The term "evil" is used advisedly since the crossing of major streams necessitates the diverging from our highly organized method of overland laying and substituting therefor one of several rather specialized techniques, the choice of which depends upon individual conditions. During the past five years, we have had occasion to lay three groups of oil pipe lines across the Mississippi River. Due to particular conditions prevailing for each crossing, we have used in each instance a different method. The purpose of this paper is to discuss these crossings and to point out the relative merits of each with respect to speed of laying, cost and seasonal influence.

All three of these crossings employed the use of oxyacetylene welding, and the writer proposes first to discuss briefly the type of joint used, together with comments on the matter of weld reinforcement. All of our work, up to the present time, has made use of the Ripple type of welding and we have standardized upon this type of oxyacetylene welding because our overland pipe line experience has shown it to be practically a 100 per cent strength joint. New developments are under way in the province both of electric and gas welding, and in view of these developments, we would not want to go on record as saying that our next major river crossing will not take cognizance of these developments.

Design of Joints

With regard to the design of the joint itself, on two of the crossings, we used what is commonly known as the straight single "V" butt joint. On the third crossing we made use of a double bell and chill ring butt joint, for the purpose of comparing this type of jointure with that previously used. In this latter type of joint, the line itself being of 10-inch pipe, the ends were belled to an outside diameter of approximately 12 inches, the flat portion of the bell extending about 4 inches on each side of the weld. An 8-inch wide heavy liner was inserted within the belled end to provide a backing up of the weld and to act in some measure as a reinforcement against bending.

With regard to weld reinforcement, it is the commonly accepted practice today to employ some sort of reinforcement for river crossings. This reinforcement resolves itself into two general types: Sleeve type and strip type. The former type employs a sleeve having an inside diameter slightly larger than the outside of the pipe, and this reinforcement ordinarily requires the river pipe to be flush welded or bent to correspond to contour of girth buttweld. Upon completing the river pipe weld, the sleeve, which may have a length of from 2 to 4 feet, is centered over the weld and fillet welded at each end. The argument favoring this type of construction points out that in order for the river pipe weld to leak, at least two of the three welds must be at fault. Our experience has been confined solely to the strip type of reinforcement, which involves welding strips of steel ½"x1"x6" to 8 inches long over and at right angles to the girth weld. We have never had a defective weld of any consequence on any of our crossings and feel that strip reinforcement is adequate protection at a relatively low cost.

Reason for Reinforcement

The question is frequently raised: "Why use any reinforcement if the gas welded butt joint has a 100 per cent strength?" We believe, and our experience has shown that a properly executed weld has a strength at least equivalent to the pipe being joined. However, there are extenuating circumstances applying to river crossings which are not of such moment with regard to land lines. The unreinforced butt weld is probably satisfactory for crossings but when we consider the possibility, although it may be remote, of a joint failure, with its attendant interruption in service and its extremely high cost of repair, the slight additional cost of the welding strips, we feel, is more than justified. Furthermore, there are, no doubt, contour conditions present in a good many cases which will impose rather severe stresses upon the line. Ordinarily, no cognizance is taken of these conditions during a river crossing, although in land lines they are given due consideration and handled accordingly.

It is rather difficult to compare the cost of one river crossing as against another, since modifying circumstances are seldom twice the same. Before considering in detail the three types of crossings to be discussed, the writer would like to point out some of the factors influencing cost. Dealing first with minor items, the following will probably apply regardless of whatever technique is employed in actually laying the line: (1) Dredging, either at the approach to the river or upon the bottom. (2) Shallow water conditions interfering with the movement of the barges, and or necessitating the use or nonuse of river clamps. (3) Wind and weather. These elements are secondary to the major items of cost; that is, the purchase price of the pipe itself and the expense incidental to the actual laying of the lines, the latter varying considerably, depending upon the method employed. The purchase cost of the pipe is the largest single, individual item of expense amounting in general to from 50 to 55 per cent of the entire cost of the job and the laying cost, approximately from 25 to 40 per cent of the total. The technique of laying is, in substance, the only element of the total cost which falls to an extent at least within our control and is directly concerned with the method employed.

With these remarks as a preamble, the writer shall endeavor to describe three separate and distinct methods which the Prairie Pipe Line Co. has made use of for the crossing of a major stream, summarizing the advantages of each, together with the way in which they reflect upon the total cost of the job.

Conventional Barge Method

There is no particular novelty in the laying of a pipe line across a major stream. This has been done by several companies any number of instances in the past. However, to our knowledge, no lines utilizing welding for joining the pipe were laid across a stream of major importance prior to the time the Prairie Pipe Line Co. laid an 8-inch line across the Mississippi at Wood River, Ill., in 1927. We believe this marks the initial venture in a gas-welded line for a major crossing. Our experience with crossings prior to that date had been confined solely to screwed lines, and when it was proposed to apply welded construction to the above crossing, we were naturally ultraconservative. The method employed was nothing more than an adaptation of the method used with screw coupled lines, in which the laying was from a single barge. This method is, no doubt, familiar to you, so the writer will reserve detailed description for the two methods later employed. Some statistical data, however, may be of interest. The river at this point was approximately one-half mile wide and the 8-inch pipe was laid in 40-foot random lengths. Naturally, extreme precaution was taken during welding and care was exercised in securing as welders only those men whom we knew from past experience were capable of putting in a 100 per cent strength joint. The welding at all times was carried on under exacting supervision and it may interest you to know that on this first venture we laid only approximately six joints per day. As would naturally be anticipated, our cost of laying was unduly high; however, our confidence in and experience with this type of joint would today be reflected in a much lower cost, with similar equipment.

Crossing the River on Ice

During the summer and fall of 1929, the trunk lines of our northern division were being operated to their maximum capacity and the desirability of laying additional lines was recognized, but it was not until December that work could actually be undertaken. One of these 8-inch lines extended from the Fort Madison, Iowa, pump station to a point approximately 10 miles east. This location necessitated the crossing of the Mississippi River, which at this point is approximately 2½ miles wide, due to the backwater of the Keokuk Dam, located 20 miles south and downstream from Fort Madison.

Due to the approach of cold weather, we realized that to lay this line from barges would be not only an expensive process, but would be fraught with considerable danger because of ice on the river. It became apparent that if this line were to be laid before spring, we would have to make the crossing on ice. During the interval between the laying of the line at Wood River, which has just been described, and the contemplated line, we had been using the gas welding process exclusively on all of our land lines; and during this time our familiarity and experience with this process and our belief in it as a method of pipe jointure, confirmed our belief that the laying of a gas-welded line across the river on ice at Fort Madison would prove to be both satisfactory and economical.

The actual stringing of pipe was delayed until the latter part of January, 1930, at which time the ice was from 10 to 12 inches thick. There was from 4 to 6 inches of snow on top of the ice which retarded freezing, and this snow was removed along the line of our contemplated activity in order to increase the ice thickness and add to the safety of our operations.

The 8-inch pipe was strung and laid by the usual method used on land, and as naturally would be supposed, considerable care was exercised and due consideration was given to the danger of breaking through the ice. In order that no undue hazard would be overlooked, we employed the services of an ice superintendent, a man who had had considerable experience with ice and as a result of such experience was in a position to know

Ice plow cutting ice on Mississippi River preparatory to lowering pipe.

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definitely the extent of the hazards involved. Excessive loading of the trucks was guarded against, and the loaded trucks were routed over a wide area In fact, all of our operations in connection with the laying of this line were spread over as large an area as was practicable.

Provision for Slack

Since the line was laid on a practically level surface, and the profile of the river bed was irregular, provision had to be made for slack, so that there would be sufficient pipe for the line to adjust itself to the river bed after lowering. Soundings were taken at regular intervals across the river and from these measurements the amount of horizontal slack was calculated Extremely low temperatures prevailed throughout the course of construction, the temperature varying from zero to 25° below, which complicated matters slightly We started out using generated acetylene, but changed to cylinder acetylene for the added convenience of dissolved acetylene in the face of these adverse weather conditions. Because of our exposed position, we rigged up portable shelters for the welders made of corrugated sheet iron open on one side, and provided with handles so that they could be easily moved from one location to another. We were agreeably surprised to find that notwithstanding weather conditions, the speed of welding was not materially decreased. In spite of the low temperature, the increase in welding cost amounted to probably not more than 10 per cent over what we could expect under summer weather conditions.

The conventional laying organization and the same sequence of operations which would be used on a land line were applied on this crossing.

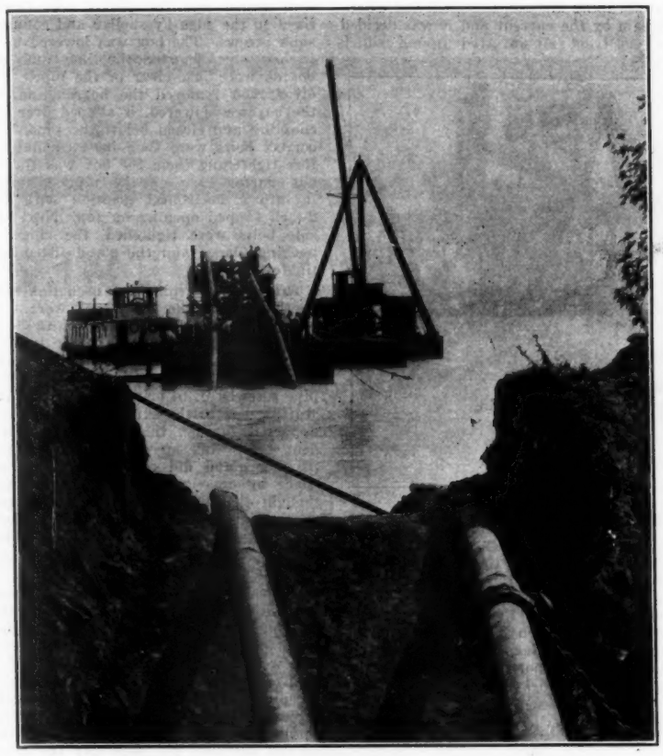
The entire length of the 2½-mile crossing was welded, and the river clamps put in place before the actual lowering of the line was undertaken. (Would like to mention at this point that river clamps, in all of our crossings are not used in any sense as a reinforcement of the weld, but are used merely to weigh down the pipe.) We were not particularly concerned with the hazards during the stringing and welding of the line but did take extra precaution with the operations involved in lowering the line through the ice. On the lowering-in gang, the men worked in pairs tied together with ropes, and we also avoided grouping of men and equipment as much as possible. We thought ourselves pretty well able to cope with any emergency and it may interest you to know that we had no serious accidents during the entire crossing.

Ice plows pulled by horses were used to cut the ice about 2 feet on each side of the pipe line and hand saws were used occasionally to finish the cutting, if the ice happened to be too thick for the plow. The line was lowered with derricks and pipe windlasses, but these were used merely to lower the line down gradually, as the weight of the pipe itself was sufficient to break and push down the cut strip of ice. The entire construction period, beginning with the stringing of the 2½ miles of pipe and ending with the lowering of the line into the river, covered 10 days.

The Ramp Barge Crossing

The generally accepted method of laying river crossings when barges are employed has been to weld and lay a single line in one operation, and if more lines are to be laid, to repeat the first operation until the required number of lines is completed. We departed from this method of construction in our third Mississippi River crossing, put in during August and September, 1931. This crossing, at Fort Madison, Iowa, was novel in that it made use of a ramp method in conjunction with the laying of two lines simultaneously.

The distance across the Mississippi River at Fort Madison is approximately 2½ miles, the lines crossing two channels and one submerged island. River clamps were used on such pipe as lay within the main channel, the dead weight of the pipe itself being sufficient for the backwater areas. Both lines were 10 inches in diameter with a one-half inch wall thickness, weighing 54.7 pounds per foot, the pipe being in 40-foot random lengths. On this crossing we departed from our usual practice of employing the straight single "V" butt type of weld and used instead a double bell and chill ring type. In this instance, as with the other crossings, the straight butt weld was used with no failures whatsoever; and our employment of the double bell and chill ring joint for this crossing was an endeavor on our part to find out through actual application whether this type of joint had any advantages over that which we have previously used. We felt that possibly some benefit in line-up would be derived from the liner and, further, that it would act in a measure as an increased support to the joint to withstand bending stresses. Our conclusions with regard to this design were that, although the chill rings may minimize a stress concentration at the weld, due to bending, nevertheless, the strip type of reinforcement is more than ample to take care of any ordinary river bottom condition. Further, the chill ring itself does not aid materially in line-up of the pipe, but instead does retard the welding speed appreciably; and, obviously, the increase in diameter due to the belling operation necessitates the making of a weld in 10-inch pipe which is nearly equivalent to what would be made in straight end pipe having a diameter of 12 inches.



Laying two lines simultaneously across the Mississippi River at Fort Madison, Iowa.

Double Length Pipe

In order to reduce the number of welds necessary to be made on the barge, the 40-foot random lengths were double lengthened into 80-foot random lengths by welding a sufficient amount for both lines. This operation was carried out on the bank of the river, acetylene being supplied from portable generators. While double lengthening was in progress, work was proceeding on the floating equipment, preparatory to the actual river crossing. The principal floating equipment used in this crossing consisted of the following units: One 80-foot pipe transport and storage barge, two 110-foot laying barges, one power barge equipped with boom and steel winches and one Diesel engine driven stern wheel tug. The laying barges were lashed together end to end, thus giving a working deck area of 24'x220'. Upon this deck an inclined ramp was constructed using for the purpose junk 8-inch pipe. The high end of the ramp was slightly more than 22 feet above the deck, the incline from this elevation making an angle with the deck of about 7°. During the greater part of the crossing, the angle of sag of the pipe as it was fed off the barge did not greatly exceed this amount; which meant that there was but a very slight bend imposed upon the lines as they left the rails on the ramp. On the top cross members of the ramp, two tracks were constructed of 30-pound rails, which were welded parallel to each other running the entire length of the ramp. The rails for each line were spaced to accommodate a 10-inch river clamp. Wood floors and guard rails were placed along the length of the ramp top at points where labor activities were concentrated.

The sequence of laying operations was as follows: In the beginning, three 80-foot lengths of pipe were placed between each pair of rails and four oxyacetylene welders, two men to each joint, completed the two welds at the lower end of the ramp. When these welds were completed, reinforcing straps were welded over the joints by electric arc welding. The gas welders then moved forward on the ramp and completed the two remaining open joints. Upon completion of the welding, barges were ready for their first move. A rather novel means was used in assisting the moving of the barges across the river. With the two lines riding between the rails, a cable from a tractor winch, located at foot of ramp was run along to the high end where it was attached to the end of the welded pipe lengths. Thus, when power was applied to the winch, the barges pushed themselves along, using the lines which were being laid as barge poles. This movement was occasionally assisted by a steam winch operated from power barge, when barges were in shallow water and riding on mud.

Time Required

When, by this method, the barges had been moved a distance of 80 feet, the last completed welded joint was brought into position for the application of the reinforcing strip and the placing of two more 80-foot lengths of pipe. This procedure was repeated at the completion of each pair of gas welds and you will note that the set-up was such as to prevent loss of time in welding on the reinforcing strips and, later, of bolting on the river clamps when we reached the channel.

It required approximately 60 minutes for the two welders, both working simultaneously, to make the one acetylene weld on this 12-inch outside diameter double bell joint. Lost time between welds, which included moving the barges a distance of 80 feet and placing of two 80-foot lengths of pipe in position for welding, required about 10 minutes. The actual laying time for the 5 miles of pipe was 15 days. One day was lost on account of extremely rough water. When we were considering this method of laying, some doubt was entertained whether it would be practical to lash together two barges with a ramp common between them, from the viewpoint that rough water would cause a relative motion between the two barges which would interfere with the welding operation.

Summary

As mentioned previously, with the exception of the purchase cost of the pipe, the largest individual expense incidental to a river crossing was the cost of laying. In view of the fact that the three lines which have been described employed in each instance an entirely different method, the writer would like to summarize briefly the particular advantages of each method.

From the standpoint of laying cost, the ice crossing was the cheapest of the three. We should naturally expect this, because our field organization and laying methods were substantially the same as we apply in land practice. A further advantage which applies only to this method is that it may be subjected to the full working pressure, and any leaks noted and repaired before lowering. Although a crossing laid under such conditions might appear to be extremely hazardous, our experience has led us to believe that there is no particular danger involved so long as ordinary precautions are taken. It is probably true that the particular province of the ice job applies only to a single line. Obviously for multiple line crossings, there would be considerable difficulty in applying this method—particularly since rather extreme hazard would be involved when the ice had been cut to lower one line, which would naturally tend to weaken the ice for further operations in lowering a second or third line. Two limitations must be placed upon this method; first, if any dredging is required, obviously the ice crossing is out of the question, and, second, the ice crossing naturally can only be made during the winter season, which may not be in line with the pipe laying program.

It is in the laying of multiple lines that the ramp method holds out interesting possibilities of reducing costs as compared to conventional barge laying. This is possible through the simultaneous laying of two or more lines. The overhead on floating equipment may easily amount to several hundred dollars per day, which factor will more than justify the expense incidental to the construction of the ramp. Furthermore, if particularly deep water conditions are encountered, the ramp method, since it allows the pipe to leave the barge at an angle, will impose less bending stress upon the line during laying than would be the case with the conventional barge method. In applying the barge method, whether the ramp construction is employed or not, we strongly indorse lengthening the pipe into sections as long as permissible prior to undertaking the actual laying of the line. The barge welding must necessarily be of bell-hole type, since it is not possible to rotate the pipe during welding. However, on the double lengthening operation, the pipe can be rotated with a considerable saving in welding cost.

In closing, the writer would like particularly to pay tribute to the welding industry which, through its constant research and improvements in welding methods, has made it possible to effect a reduction in pipe laying costs. Speed of laying these pipe lines was principally dependent upon the speed of welding and with the more efficient methods for welding already developed, and in process of development, future laying costs undoubtedly will still further be reduced.

Repairing Leaks in River Crossings

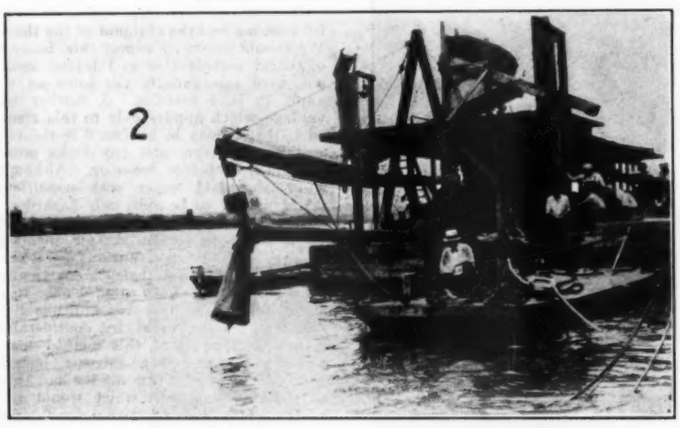
Description of Work Done by Stanolind Pipe Line Co. Engigineers in Reconditioning Lines Across Mississippi River

By J. J. Boyd, Stanolind Pipe Line Co., Tulsa, Okla.
Presented before Mid-Continent Section, A.S.M.E., Tulsa, March 10.

It is most likely that every leak repair in a large river would present a different problem. The writer has had experience with only two such jobs and this paper will be confined to a discussion of those two.

First: The repair of a small leak in the Stanolind Pipe Line Co.'s No. 1 8-inch line in the Mississippi River a short distance below Fort Madison, Iowa.

This company has three 8-inch lines and one 12-inch line crossing the river at this point. During the late spring of 1931 a small oil leak in one of these lines was reported by the employes of the Prairie Pipe Line Co. By triangulation this was found to be the No. 1 8-inch line and this line was shut out of service with the result that considerably less oil was found on the water.



Dredge with suction line equipped with funnel.

Since the No. 1 line is a screw line laid in 1917 and the Prairie Pipe Line Co. has reported considerable trouble with pit leaks in its lines a short distance above, it was decided to repair the line with a stuffing box which would be satisfactory for either a pit or a collar leak. Due to the dam at Keokuk, Iowa, about 15 miles below the pipe line crossing, Fort Madison has practically the same water elevation the year around. Soundings indicated that the top of the pipe line at the leak was 19 feet below the water surface with about 1 foot of sand over it. Under these conditions the best method of placing the stuffing box on the line was to dredge the same away from the line and have a diver put on the box.

Equipment

The following equipment was rented for this work:

One 75-horsepower Diesel towboat.

One sand barge for a material and work barge.

One steam powered 8-inch centrifugal suction dredge.

One small deck barge for working close to the water.

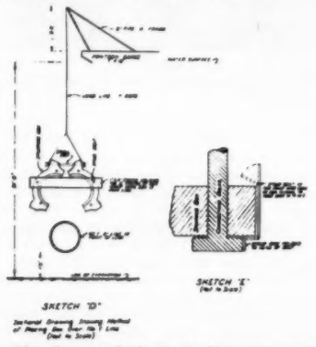
One rowboat with outboard motor for errands.

A diver with attendant and equipment was secured from Chicago.

A few days before this work was started the oil in the line had been displaced with air at 110-pounds pressure. This air pressure was maintained on the line during all the repair work and served the double purpose of facilitating the finding of the leak and showing at all times the amount of leakage.

The stuffing box used was one of the company's standard boxes except that steel packing glands were used instead of the customary cast iron glands. It was also decided to use graphite shredded lead packing instead of hemp or rubber.

After the fleet had been located and anchored as shown in sketch, the diver went down and found about 1 foot of fine silt over the line, making it difficult for him to exactly locate the leak. The suction of the dredge was lowered and the line cleared of silt for a distance of about 12 feet each side of the river clamp. The diver again went down and reported that the pipe was not pitted and that he could find no leak. It was known that the escaping air was being carried downstream by the current and it was decided to construct an inverted funnel which could be placed over the line and moved along the pipe until the bubbles were confined and brought vertically to a slot in the pipe just below the water level where they could be seen escaping. With the diver below guiding the funnel and the crew above supporting the weight and keeping the funnel vertical the leak was found 20 feet farther east than was expected. It was then necessary to dredge at this new location to clear this coupling. The clamp over this coupling was a heavy cast iron "river clamp" of the type used on most pipe lines in rivers and swamps to add weight to the line and strength to the joints. The diver next removed the clamp bolts and the clamp was brought up in halves. He then cleaned the line thoroughly with wire brushes preparatory to putting on the stuffing box.



Showing method of placing box over No. 1 line. Also clip for holding bolt head.

Lowering Stuffing Box

The stuffing box was dismantled with seven rings of shredded lead packing in place in one end. The stuffing box was held open to fit over the line and to lower into position. The packing was cut and carefully fitted into the box before lowering to the diver to facilitate his work in packing the box under water.

Two bolts smaller than the bolt holes in the stuffing box held the halves together at the top while a 1"x4" plank bored for the packing gland studs held the lower edges apart far enough to admit the line coupling. The machined edges of one of the halves of the stuffing box were fitted with an eighth-inch sheet lead gasket and the gasket was firmly fixed to the edge by shellac and countersunk screws. The box was lowered until it had started over the line and the boards were just clear of the pipe. The diver then removed the boards and, as the box was lowered, it slipped over the coupling and closed below the pipe. The correct bolts were then inserted and before tightening them the box was turned one-quarter turn on the pipe to bring it into a horizontal position with the 2-inch tapped opening on top. Next the side bolts were tightened, the rings of packing placed and the gland fitted and tightened.

After a 2-inch plug had been tightened in the top of the box there were still some air bubbles appearing on the surface. To be sure that no other leak in the line was causing these bubbles, the 2-inch plug was removed and a 2-inch pipe screwed in to bring the air from the stuffing box to the surface. Since no air appeared through this pipe, it was evident there was no other leak. As the packing gland did not fill the packing space by one-eighth of an inch, it was thought that more pressure could be put on the packing by inserting a solid lead ring between the gland and the shredded lead packing. This was done and all bolts again tightened.

A hose from an oxygen tank was now lowered through the 2-inch pipe into the stuffing box and the water in the pipe and box blown out. After the pipe and box were filled with cement grout of a fluid consistency using the funnel again, the pipe was removed and the plug again screwed in and tightened. A very few small air bubbles were now appearing on the surface. The next day the diver was sent down again and after drawing all bolts a little tighter no air bubbles appeared on the surface. The oil was turned into the line and the repair was reported complete as no oil appeared on the surface of the water.

This work consumed five days from the time the fleet was anchored at the leak until the line was put in service. The line has been in service without a leak since the repair was made early in July, 1931. The labor and equipment rental cost was $1,600.

This repair was made under the supervision of our general superintendent, William G. Heltzel, assisted by Division Superintendent J. J. Cartmill, Welding Superintendent A. M. Hill, Division Engineer W. E. Brewer and the writer.

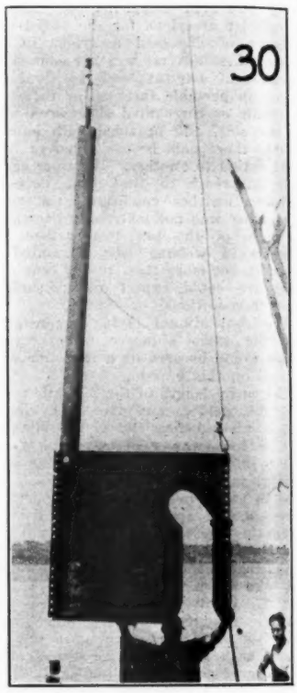
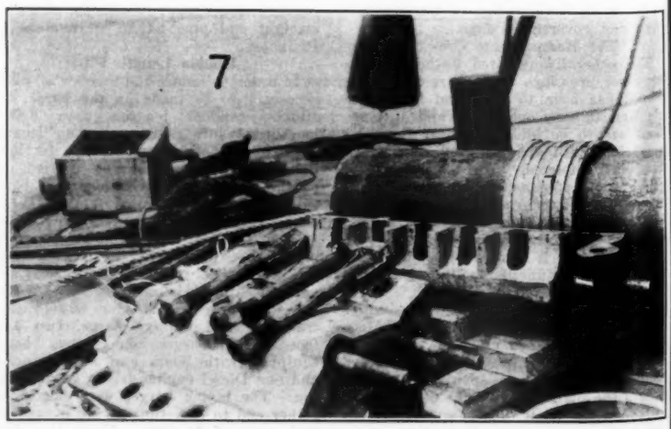


Plate with 6-inch guide pipe for closing opening in cofferdam.

Second Repair Job

The No. 2 eight-inch line had been cut out of service since February, 1929, when a leak had occurred which lost 3,600 bbls. of oil in three days. The leak was on an island about the center of the Mississippi River. When the Keokuk dam was completed in 1913 this island was covered with from 4 to 16 feet of water. The No. 2 line is a screw line laid in 1918 and



Stuffing box with special bolts and packing.

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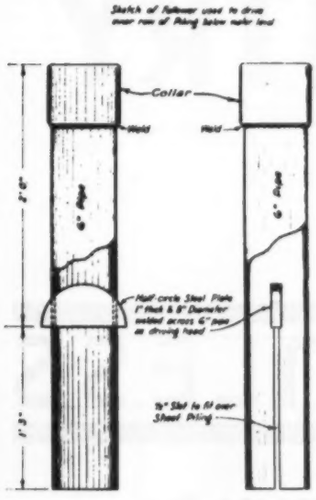
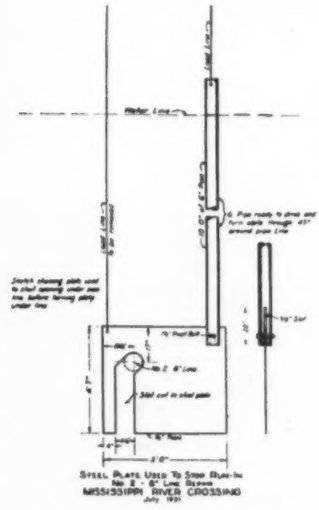
since that time 5 to 6 feet of silt has been deposited over the pipe. When soundings were made at the leak in July, 1931, there was found to be 5 feet of silt and 4 feet of water above the top of the line. A stuffing box was put on the line after the first leak, but this job was not successful and, in June, 1931, two plans of repair were considered:

1. Dredge the line clear, raise it above the water and repair by welding. This plan was discarded because of the danger of springing collar leaks at other joints.
2. Sink an open sheet pile cofferdam


Sketch of follower used to drive inner row of Piling below water level
Collar
Weld
Weld
6" Pipe
6" Pipe
Half circle Steel Plate 1" thick & 8" Diameter welded across 6" pipe as driving head
To" Slot to fit over Sheet Piling

Steel sheet pipe follower used in placing sheet in position on No. 2 repair job.



Steel plate used to stop run in No. 2 line Stanolind Pipe Line Co.

and repair the line by welding. The latter plan was adopted and the equipment used in the No. 1 line repair was secured in addition to the following:

One 10-ton floating derrick with 70-foot boom.

One three-fourths-yard clamshell dredge bucket.

One 700-pound drop hammer with swinging leads.

Ninety Lakawana steel sheet piles 9½"x15' at 15½ pounds per foot.

A loading dock near the job was rented for the duration of the work.

Work Started

On the morning of July 21 the fleet was towed to the site and anchored, spotting the derrick in such a position as to conveniently dredge over the leak. The oil in the line had been displaced with air as in the No. 1 line. There was very little if any current at this place and the air was rising vertically from the leak.

Preliminary to this work four lengths of 4-inch pipe had been bent into half circles for cofferdam bracing. These half circles were welded into two whole circles of 8-foot 10-inch outside diameter, placed in parallel planes 5 feet apart and held thus by four posts of 3-inch pipe welded in place. The disturbance caused by the rising air bubbles gave an idea of the size of the leak.

The first step was to set and level the bracing. It was set on the mud by means of a three-way sling and leveled by tapping lightly on the high points with the drop hammer.

Three piles were then set over the pipe line on the west side of the cofferdam and likewise on the east. Of these three piles, the center one was located exactly over the line while the outside ones went on by and below the pipe line. This was done to be assured that there would be only one high pile on each side of the circle as it was thought that considerable trouble would be encountered from mud running through this opening under the line. The balance of the piles were driven to a penetration of about 8 feet below the pipe line. From these three piles, the other piles were set each way toward the opposite side making the key-in points on the north and south sides.

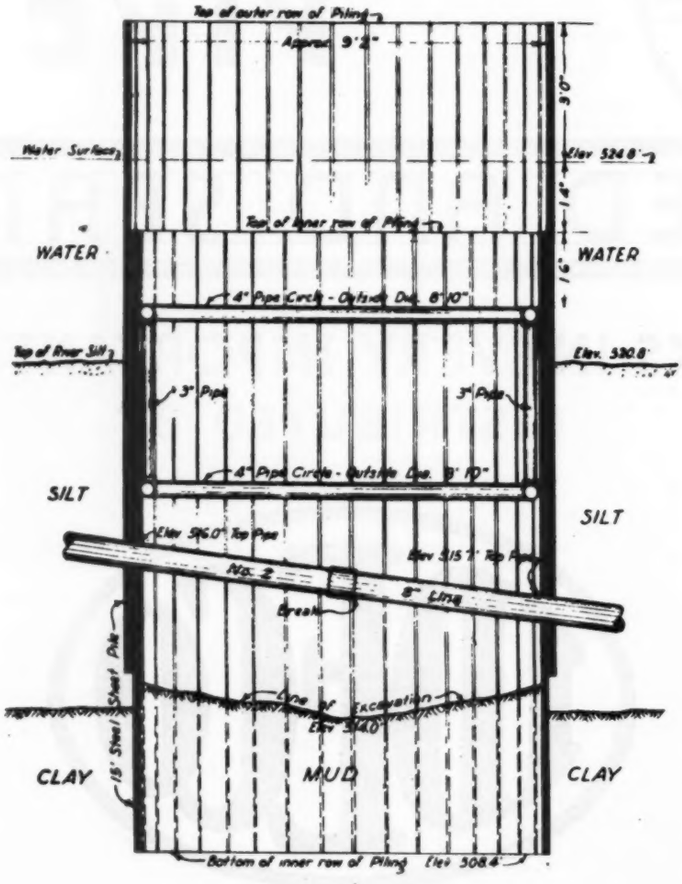
Piles Driven

All piles, excepting the two resting on the line, were then driven to 6-inch above the water, and enough silt was dredged from the inside of the cofferdam to allow the pipe bracing to drop about 4 feet. As it was judged that a piling penetration of about 8 feet below the line was advisable, it was necessary to drive the tops of the 15-foot piles 2 feet below water surface, and since a drop hammer was used for driving, a pile follower was required to drive the piles below water. The follower is shown in sketch.

Another circle of piling was set outside, but in close contact with this circle and driven to 3 feet above the water. While sheet piles 18 feet or longer would have made this cofferdam with only one circle of piles, it was considered cheaper to drive two circles of these light 15-foot piles which were near at hand than to ship in longer, heavier piles. By means of the clamshell the silt was dredged down to the top of the pipe line and the cofferdam was ready to unwater. After two 3-inch steam siphons were placed and started, horse manure thrown on the water around the cofferdam quickly stopped the leaks through the pipe interlocks and one siphon easily held the water down after the cofferdam was unwatered.

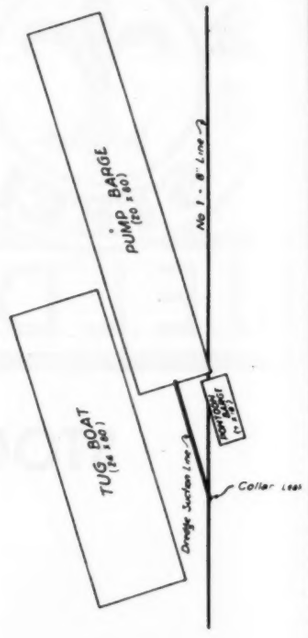
Plates Put in Place

Upon starting further excavation to clear the line, silt began to ooze in under the lime through the openings under the two high piles. After continuing this excavation for about four hours without any reduction of run-in, it was decided to close the opening below the lime with steel plates. In this connection, it should be said that the idea of the steel plate was original with A. M. Hill and this method was chosen as likely to be the quickest and surest way of closing the opening. Picture and sketch show the plates before they were used. Preliminary to placing the plates in position the silt was dredged away from the pipe outside, and on each side of the cofferdam. The plates were lowered over the line with the slot vertical and the plates as near the sheet piles as possible. By means of a sheet pile guided by hand and hoisted by engine, the plates were tapped downward until the pipe line was in the very top of the slot. This was ascertained by measurement and by diving down and feeling the opening. Both plates were placed in this position first. Then using the leads and drop hammer the 6-inch pipe, which was fastened to the plate to take the blow of the hammer, was driven down until the plate was on a 45-dgree angle closing about 4 feet of the opening below the line. Two broken bales of hay were then floated over this point on each side and silt backfill was dropped on the hay. The hay was used to stop any small openings between the plates and the piles.



VERTICAL CROSS SECTION OF COFFERDAM
No. 2 - 8" LINE REPAIR
MISSISSIPPI RIVER CROSSING
July, 1931

After unwatering again, excavation was begun and was continued without any run-in to 15 feet below the pipe line. The stuffing box which had been used unsuccessfully two years previously was removed and the pipe was found to be broken in the last thread on the bottom side about one-third around the circumference. Two sand boils raised the bottom 4 inches during the three and one-half hours consumed in repairing the lime. A hole was cut near the collar to allow the line to be "mudded up" and the welders starting to weld the coupling to the pipe.



SKETCH 'A'

Location of Barges and Tug Boat in reference to leak (Not to Scale)

The air pressure had been released from the line the previous day. When the hole was cut, three-quarters of an inch of oil was found in the line at this point and it was necessary to mud off the gas and oil each side of the collar. The line was welded to the collar completely around both sides and the hole was patched. A river clamp was put on over the joint, the cofferdam was flooded and oil was turned into the line for a test. When no signs of a leak were found the next morning, all piling and bracing were removed and the fleet was released.

This repair job consumed eight days and cost $2,600. The work was supervised by the same force as the No. 1 line repair with the exception of Mr. Heltzel, who was unable to be present until the last day. This line has been in service without a leak since last July.

U.S.G.S. CHANGES

Hale B. Soyster, formerly supervisor of the Rocky Mountain district, with headquarters at Casper, Wyo., has been transferred to Washington, D. C., in charge of the mineral leasing department of the U. S. Geological Survey.

Harold J. Duncan, formerly deputy supervisor of oil and gas leasing division of the Mid-Continent district, U. S. Geological Survey, with headquarters at Muskogee, Okla., has been transferred to Casper, Wyo., as supervisor of the Rocky Mountain division. E. A. Hanson, deputy supervisor, with former headquarters at Roswell, N. Mex., is transferred to the Muskogee office.

The Diesel Driven Centrifugal Unit

Installation and Operating Costs of Recently Designed Engine Are Given. Advantages and Disadvantages Listed

By J. B. Harshman, Stanolind Pipe Line Co.
Presented before Mid-Continent Section, A.S.M.E., Tulsa, March 10.

During the early years of the oil industry, pipe lines were dependent almost entirely upon the steam-driven pumping unit, which, owing to its low thermal efficiency, was rendered more or less obsolete by the development of the Diesel engine.

Most Diesel driven pumping units, until recently, have consisted of an engine direct connected through a flexible coupling to a reciprocating pump. Such units, having a mechanical efficiency of around 80 per cent for the engine and a mechanical efficiency of from 85 to 90 per cent for the pump, have been considered about the best type of equipment for pipe line work. However, such units require a large investment in foundations, buildings, cooling systems, auxiliary installations, etc.

With the development of the higher speed Diesel engine the Diesel centrifugal unit, with a gear increaser, has come into service.

Until recently the centrifugal pump has been driven almost exclusively by the electric motor. Such units have the advantage of low installation costs and low annual fixed charges, but these savings are offset in most cases by high electric power rates.

With the Diesel driven centrifugal unit it is possible to reduce the investment and installation cost, which combined with low operation costs, gives it a competitive advantage over other types of pumping units which have been in general use.

Such a Diesel driven centrifugal unit has been installed by one of the principal oil pipe line companies. The engine is a 300 horsepower vertical, six-cylinder, four-cycle, solid injection type, 750 r.p.m., which is direct connected through a flexible coupling to a single pinion gear increaser of 4.73 to 1 ratio. The high speed shaft of the gear increaser is direct connected through a second flexible coupling to a 6-inch four-stage centrifugal pump, operating at 3,550 r.p.m. The capacity of the pump is 25,000 bbls. per day at 450 pounds per square inch line pressure.

Foundations

The pump and gear increaser are mounted together on a cast iron base plate and grouted in integral with engine foundation. The whole foundation, when resting on firm soil, requires only 30 yards of concrete.

Installations of this type can also be assembled on "I" beams and operated with no foundation. This method is particularly desirable for rush installations in flush fields.

An all-steel building 20 feet wide by 34 feet long houses the unit with ample room on all sides. The total length of the unit being approximately 22 feet. The unit weighs 22,000 pounds, of which the engine weighs about half. Thus, one can see the advantage of portability when used for temporary installations or in remote places, which can be made in four to six days. The manufacturers point out that with the use of "I" beams instead of a concrete foundation, the installation can actually be made and placed in operation in from 24 to 48 hours.

The water system for jacket cooling consists of a 2½-inch centrifugal pump mounted directly on the engine and driven from the engine crankshaft and two 1,600-bbl. steel tanks for water storage. However, on future installations a heat exchanger in either the oil suction or discharge line will be used, cooling the jacket water with crude oil, which is a much cheaper and more efficient system. This system of cooling is particularly desirable for installations where water supply is scarce or condition of water is not desirable for jacket cooling. As with the closed system, the engine can be operated on a small amount of soft water.

Mechanical Efficiency

The overall mechanical efficiency is rather low in comparison with electric motor drive. Engine mechanical efficiency, 80 per cent; pump mechanical efficiency, 75 per cent; gear increaser mechanical efficiency, 98 per cent; 80 × 98 × 75 = 59 per cent overall mechanical efficiency.

This installation is interesting from the viewpoint of portability, flexibility of operation and quick installation. The greatest interest, however, is in its operation cost and its competitive position as a prime mover for pipe line pumping in flush fields. With this thought in mind the following tables have been prepared to show the investment, operating costs, fixed charges, depreciation and the cost per kilowatt hour, using, two, three and five-year depreciation.

Investment cost Diesel centrifugal unit, 25,000 bbls. daily capacity at 450 pounds pressure, 75 per cent L.F.:

TABLE 1—INVESTMENT

Engine, 300 B.H.P.	$12,000
Pump, 6-inch 4-stage	2,000
Gear increaser	1,400
Couplings	350
Foundations 30 yards	350
Building steel, 20x34	750
Heat Exchanger	750
Oil piping and connections	5,000
Installation labor	1,000
Miscellaneous expenditures	1,500
Total	$25,100

TABLE 2—ANNUAL OPERATING COST

Maintenance, 300 h.p. at $4	$1,200
Fuel oil, 0.5 pound per B.H.P., 2,850 bbls. at $1 per barrel	2,850
Lubricating oil, 2,000 B.H.P. hours, 828.5 gallons at 60 cents per gallon	497
Rags, packing and miscellaneous	350
Overhead and supervision 2 per cent.	502
Total	$5,399

TABLE 3—SALVAGE VALUES AND ANNUAL DEPRECIATION

Salvable material—	Initial cost	Depreciation period— 2 years salvage value	3 years salvage value	5 years salvage value	5 years total dep.
Engine	$12,000.00	$10,200.00	$9,000.00	$7,800.00	35%
Gear increaser	1,400.00	1,120.00	980.00	700.00	50%
Pump	2,000.00	1,700.00	1,500.00	1,300.00	35%
Couplings	350.00	280.00	280.00	280.00	20%
Heat exchanger	750.00	525.00	412.50	187.50	75%
Pipe and fittings	5,000.00	3,000.00	3,000.00	3,000.00	40%
Building	750.00	600.00	525.00	375.00	50%
Total salvage value		$17,425.00	$15,697.50	$13,642.50	
Complete installation cost		25,100.00	25,100.00	25,100.00	
Less salvage value		17,425.00	15,697.50	13,642.50	
Total depreciation		$7,675.00	$9,402.50	$11,457.50	

TABLE 4—TOTAL FIXED CHARGES

Deprec. period	Per cent taxes, insurance, interest	Amount taxes, insurance, interest	Amount depreciation	Total annual fixed charges
2	7.5	$1,882.50	$3,837.50	$5,720.00
3	6.9	1,731.40	3,134.16	4,865.56
5	6.6	1,656.60	2,291.50	3,948.10

TABLE 5—ANNUAL OPERATION COST AND COST PER KILOWATT HOUR

	2 years	3 years	5 years
Annual fixed charges	$5,720.00	$4,865.56	$3,948.10
Annual opr. cost unit	5,399.00	5,399.00	5,399.00
Total annual cost	$11,119.00	$10,264.56	$9,347.10
Barrels oil pumped per year—6,850.00:			
Cost per barrel	$0.00161	$0.00150	$0.00136
Cost per kilowatt hour	0.00872	0.00830	0.00735

Total kilowatt hours per year—1,275,744.

Advantages

1. Low operation costs, being about half that of electric drive.
2. Variable speed, which is very essential in pipe line work.
3. Eliminates the payment of demand rate when not in operation as compared with many electrical installations.
4. Can be moved and erected in remote places where power lines are not available.
5. Quick installation.
6. Can be installed in places where water conditions are bad and operated on closed cooling system with small amount of soft water.

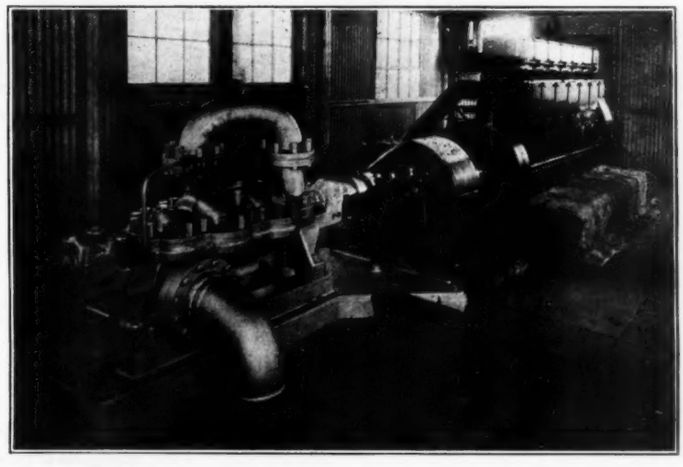
Disadvantages

1. Low overall efficiency.
2. High maintenance costs as compared to low-speed engines and electric motors.
3. Design of high-speed engines not thoroughly proven.
4. Not as reliable as electric motor.

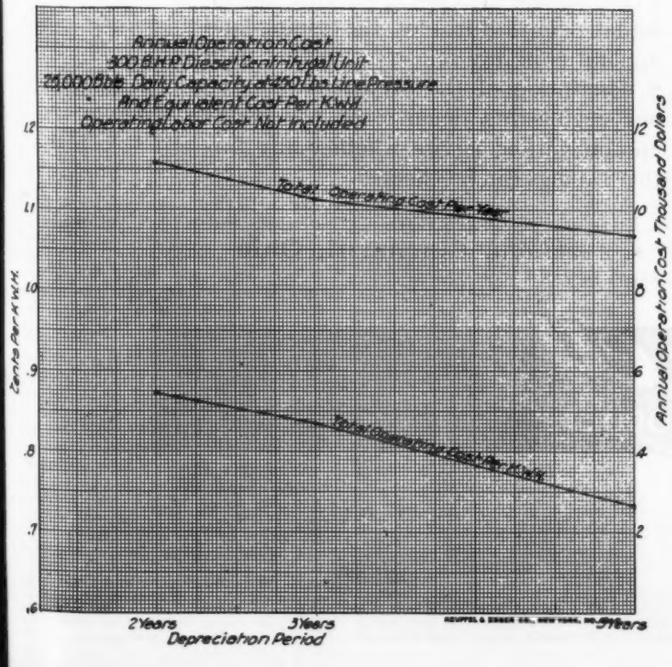
With the installation of the high-speed Diesel engine and centrifugal pump, a material savings is effected in building space, foundation, piping and installation.

The writer believes that this type unit can be used particularly for field gath-

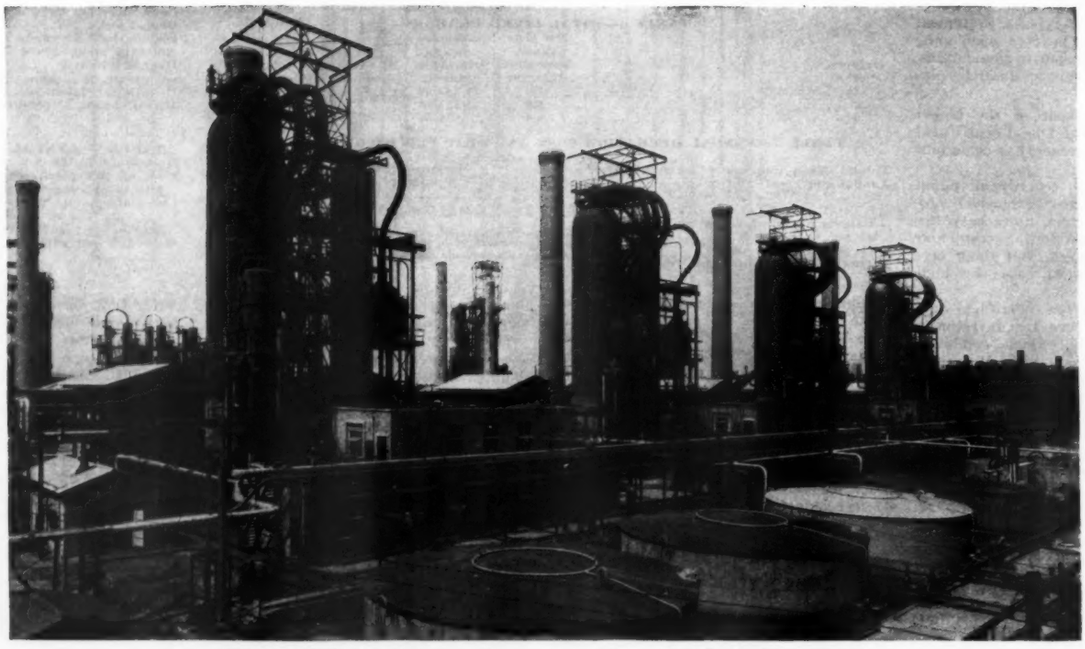
(Continued on Page 50)



Bullock Station of Stanolind Pipe Line Co. Centrifugal pump powered by Diesel engine. Gear increasers used for stepping up engine speed for pump.



Carey HEAT INSULATIONS Cut Refinery Costs



Foster Wheeler Distillation Units in a large refinery. Carey Heat Insulations used throughout.

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Closed Cooling Systems for Diesels

Advantages and Disadvantages of Various Methods of Providing Cooling Fluids for Internal Combustion Engines

By Floyd E. Warterfield, Jr., Oklahoma Pipe Line Co., Muskogee, Okla.
Presented before Mid-Continent Section, A.S.M.E., Tulsa, March 10.

The theory and general principles involved in the heat transmission between separated fluids in motion have been known among engineers for a long time. Numerous industries have applied these theories in successful practice and it seems almost incredible that Diesel powered pipe line stations should wait until 1928 to take advantage of such a simple, economic and efficient plan for a water cooling system.

C. M. Rosebrugh[1], chief engineer of the Gulf Pipe Line Co., with his associates, so far as can be determined, were the first to apply the closed cooling water system to a Diesel engine pipe line pumping station. A history of their first installation is quite interesting, and the writer believes that their experiences incident to its construction are quite common to all Diesel stations using the familiar open type gravity system.

In May of 1928 their Midland station, located in Texas, was operating two 200 horsepower horizontal two-cylinder Diesel engines connected to 12,000-bbl. H. D. power pumps. The water system consisted of a 20,000-bbl., open storage and cooling reservoir. A gravity feed tank supplied water to the engines and overflow lines carried this water to the reservoir. A triplex pump, driven from the pinion shaft of each unit, and taking water from the reservoir, served to supply the gravity feed tank. This layout comprised the conventional open cooling water system, so common, in one form or another, to all Diesel pipe line stations.

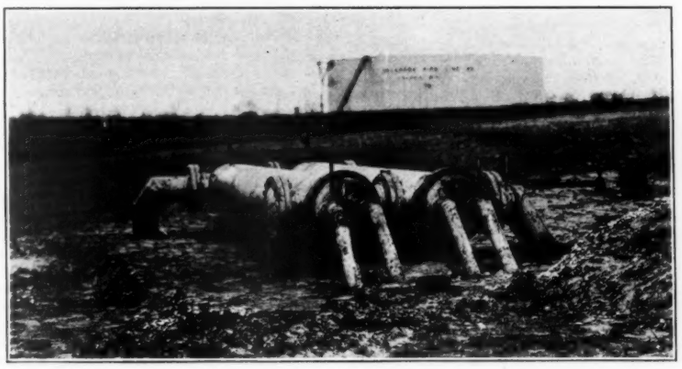
Water conditions at Midland Station finally became so bad that all ordinary methods failed to control the scale-forming solids in the water. Maintenance charges for cylinder head replacements, together with the excessive cost and unreliable results obtained from water treatment, made it imperative that something be done to reduce the station operating and maintenance expense.

Accordingly the closed system was tried out as a possible solution to the existing difficulties. The entire plan was based on the theory that only a small quantity of water, from 5 to 10 gallons, would be circulated through the engine jackets and then cooled in a tube type heat exchanger for recycling. Raw water would be used for the initial charge as well as for make-up requirements. Since the quantity of water in the system would be small it was felt that any scale-forming solids present would be too small to cause trouble and once these were deposited the softness of the water would increase.

In the original installation each unit was equipped with a Braun two-pass, floating head, horizontal exchanger having five-eighths inch outside diameter tubes and about 200 square feet of cooling surface. The exchangers were placed on the outside of the pumphouse building and on the engine room side. A centrifugal pump, having a capacity of approximately 100 gallons per minute at a 25 foot head, was located in the engine room and belt driven from the main transmission shaft. A small surge tank was constructed on top of the main engine frame between the two cylinders and furnished about 7 feet of suction head to the centrifugal pump. The surge tank is equipped with a 1-inch gooseneck on top to provide an opening to the atmosphere and with regular gauge glass fittings on the side. The gooseneck connection served as a vent to bring one point in the system to atmospheric pressure, and as a warning against carelessness in charging or a leak in the exchangers. The gauge glass indicated the water line to the station operator at all times. In the cycle of operation, hot water was taken from the bottom of the surge tank to the suction of the centrifugal pump and forced through the heat exchanger on the outside of the tubes, thence through the engine jackets and up into the top of the surge tanks. The vertical triplex pump formerly used in the old system circulated raw water from the reservoir through the tubes of the exchanger and back to the reservoir, thus carrying off the heat from the closed system water.

This original system will soon be four years old and during this time has consistently kept the cooling water incoming to the engines at about 100° F., for an outgoing temperature of approximately 130° F. Make-up requirements have varied from 1 to 3 gallons per week. Up to the present time it has not been necessary to clean or repair the heat exchangers; the engine jackets have never shown any indication of scaling and no cylinder heads have been broken since the system was installed.

[1]The writer desires to thank C. M. Rosebrugh for the generosity with which he has supplied information not otherwise available and without which this paper would be lacking in many details.



Double return pass oil-to-water, heat exchangers, parallel connected.

Lufkin Station Installation

A few months' operation of this installation was sufficient to indicate its success. In January, 1929, a closed system was installed at Lufkin Station and the crude oil pumped by the main unit was used to carry off the heat from the circulating water. This probably marks the first time that crude oil was ever used as the cooling liquid in any heat transfer system. The cycle of operation remained as it was at Midland but several important changes were made. The surge tank was placed next to the firewall instead of on top of the engine. The exchangers were placed in the pumproom and since they were connected into the tank suction line between the tank and pump, the square feet of surface was increased in order to reduce friction losses. This new plan simplified the system and since the raw water pump and its piping system were eliminated, a considerable saving was realized.

The value of the oil-to-water system was soon demonstrated and when three new stations were constructed in March, 1929, closed water cooling systems of this type were decided on at the beginning. These installations were made on 400 and 500 horsepower engines driving 25,000 and 35,000-bbl. pumps, and were of the same design as the one in operation at Lufkin Station.

In June of 1930, one very important change was made in the oil-to-water system and occurred at Sour Lake Station where a water-to-water system had been previously installed. A special vertical, combination exchanger and surge tank was in use and raw water conditions were such as to cause algae formations in the tubes. This reduced the rate of heat transfer to a point where cleaning was necessary about once every six months. Head from the stock tanks was so low that it was impractical to use a gravity flow oil-to-water exchanger. It was decided, however, to try out an installation having small tubes and of the single pass type. Oil would be taken from the main suction line and forced through the tubes by means of a low head centrifugal pump. This extra pump was placed on an extended base plate and in line with the water pump in the engine room. Both pumps were connected to a common shaft and driven by belt from the shaft of the main pumping unit. A single pass exchanger was constructed so as to fit inside the pump room. About 400 square feet of cooling surface was obtained by using three-fourths inch tubes and the entire tube bundle housed in a 16-inch outside diameter pipe; the inlet and outlet ends were fastened to the exchanger shell by means of Victaulic couplings. This arrangement proved satisfactory and the system has been in continuous operation without any interruptions in service due to scale formations, either in the tubes of the exchanger or the engine water jackets.

The success of the installation at Sour Lake Station, where oil was forced through the tubes and water circulated on the outside by means of a two-pump unit, caused the same type of water system to be decided on for the Gulf Pipe Line Co. of Pennsylvania lines, from Tulsa east, and constructed in 1930. The exchangers used for cooling the water to 325 horsepower engines driving 18,000-bbl. pumps, have 323 square feet of cooling surface using three-fourths inch outside diameter steel tubes that are housed in a 12¾-inch outside diameter pipe. Stations were constructed in a country where winter conditions are sometimes severe, and it was desirable that the exchangers be designed small enough to be placed inside the pumphouse building in order to lessen the danger of freezing water lines in case the main pumping unit should be down for any great length of time. A total of 38 cooling water units were constructed for stations on the Pennsylvania line and have given complete satisfaction since December, 1930. The make-up water, which is very small, is furnished by the same 500-bbl. tank that serves the over-all station water system.

Closed System Desirable

From the number of installations that have been made it is obvious that the Gulf Pipe Line Co. considers the closed system to be more desirable than the open flow gravity type. That this plan does eliminate many troubles that exist in the open cooling water system cannot be denied. It does not, however, operate entirely free from troubles of its own. Certain oils are known to be highly corrosive and where they have been used as the cooling medium, some trouble has been had due to the eating out of the exchanger tubes. Unless the exchanger is of good design and well constructed, there is danger of leakage at the tube sheets. Where corrosive oils are not used, this difficulty can be almost entirely eliminated by the proper location of the exchanger and the use of flexible couplings for connecting the oil and water lines to the exchanger. Whereas the exchanger system eliminates all scaling troubles, certain instances have been noted where some interior corrosion has taken place. This can be controlled by recharging the system with raw water at regular intervals, or by adding a hardening compound where the water supply is unusually soft. Maintenance costs arising from all of these objections are very low and only a small fraction of those encountered under the old system.

Figure 1 shows the cycle of operation for a gravity flow oil-to-water exchanger system. In this arrangement the centrifugal pump forces the water to the exchanger where it is cooled and returned through the engine jackets to the surge tank. At another installation using similar equipment, the pump forced cooled water through the engine jackets to the

TABLE 1—TEST OF CLOSED COOLING WATER SYSTEM. UNIT NO. 2, FRANCIS STATION. AVERAGE OF 10-MINUTE TEST RUNS
Test Conducted by J. M. Bradley and F. E. Warterfield, Jr., February 2, 1932.

Test No.	Temp. of water in engine cylinders °F.	Rate of water flow G.P.M.	Rate of water flow Lbs.	Rate of oil flow G.P.M.	Rate of oil flow Lbs.	Water temp., °F. Into exchanger	Water temp., °F. Out of exchanger	Temp. drop °F.	Oil temp., °F. Into exchanger	Oil temp., °F. Out of exchanger	Temp. rise °F.	Pressure at discharge of cent. pump lbs.	Atmos. temp. °F.
1	104 0	93.4	778	501	3,624	96 5	79 0	17.5	46.0	54.0	8.0	38.0	69
2	108.0	76.0	633	520	3,761	100.0	79 5	20.5	46.0	54.0	8.0	32.0	68
3	112.5	54.3	452	495	3,581	105.0	77.0	28.0	46.0	54.0	8.0	21.0	67
4	117.0	48.8	406	516	3,734	109.5	77.5	32.0	46.0	55.0	9.0	18.5	66
5	121.0	44.5	371	499	3,609	114.5	78.0	36.5	46.5	55.5	9.0	17.5	65
6	128.5	35.8	298	516	3,733	118.0	75.0	43.0	46.5	55.5	9.0	15.0	64
7	128.0	35.8	298	518	3,747	119.5	76.0	43.5	46.5	55.5	9.0	15.0	64

Note.—Oil pressure at outlet from exchanger remained practically constant at 4.5 pounds. Heat exchangers consisted of two return pass multiflow units having 1-inch O.D. seamless steel tubes, set horizontal and connected in parallel. Each unit has approximately 312 square feet of cooling surface. Water flows through inside of tubes. Furnishes cooling water to one 400-horsepower 4-cylinder vertical De La Vergne engine connected to Goulds 6¼x24 H.T. 23,000-bbl. pump.

exchanger and thence to the tank. If there is any difference in the operation of the two cycles it could not be detected. The only possible exception is that the centrifugal pump may operate at a slightly better efficiency when pumping cold water.

Figures 2 and 3 show two types of exchangers and illustrates the change in design that has taken place. Other things being equal, the type shown in Figure 2 can be constructed for higher pressures at a lesser cost and is primarily intended for use in two-pump, oil-to-water systems. Where this design is to be used in gravity flow lines, the available oil head at low tank gauges and the pressure loss through the exchanger should receive careful attention. If this is not done there is danger of robbing the main pumping unit of just the amount of pressure necessary to make the pump fill properly.

The correct location of the exchanger in a closed system is largely a matter of opinion which depends for the most part on each individual installation. The use of flexible couplings for connecting the oil and water lines will help to relieve the exchanger of external stresses, no matter where it is placed. If located in the suction line to the main unit, a medium pressure design can be used. The tubes should not be made too small or clogging is likely to result and in particular is this true where the tank head is low. Experience has indicated that, where the oil passes through the tubes, a velocity of 4 feet per second is required to keep the tubes free from sediment and basic sediment accumulations. If made equal to or higher than this rate, the heat transfer is increased and a saving made in the initial design cost. If the exchanger is placed in the discharge line from the main unit then a high-pressure design must of course be used. In general, this position is not recommended because not only is the investment increased, but it is the point of high-pressure surges and vibration, thereby increasing the danger of leakage. It is the writer's opinion that a more economical and satisfactory system will be had when the exchanger is placed in the suction line to the main pumping unit. Each individual installation must determine whether the one or two-pump circulating unit is to be used. Each main pumping unit should have its own circulating water system independent of any other unit for the reason that there will be no danger of an entire station shutdown due to the failure of the water supply as would be the case if one exchanger cooled the water for all units.

Cooling Engine After Shutdown

It has been the practice at most stations using the gravity system to allow a stream of water to run over the engines from 15 to 30 minutes following a shutdown. Instructions have stated that the stream of water is to be small and the reason given for this practice is that the water will remove the heat from the piston, cylinder and cylinder head to a low temperature without causing distortion, due to one part cooling faster than another. Some such arrangement is no doubt necessary in the open system, but in the writer's opinion it constitutes a serious objection to the use of this system. While it cannot be definitely proven, it is believed that cold water is often passed over the engines at a too rapid rate, thereby causing the condition it is supposed to prevent. The question of how to handle the cooling water in the closed system when the engine is stopped was answered by actual test. It was contended that if the engine was shut down and no attempt made to circulate any water through the engine jackets that the closed system would act as a thermosiphon system and that the engine parts would be cooled more gradually and effectively than in any other way. The test proved the contention, and as carried out, the rise in the jacket water temperature was from 99° to 130° in 15 minutes. Following this the temperature began to drop slowly and if any damage has ever resulted from this practice it cannot be detected.

Aside from the economy realized through station operating and maintenance costs, the closed system materially reduces the initial investment. This is best illustrated by referring to the actual costs for Station 1 and Station 2. It is possible to compare the installation costs for the open and closed systems at these stations since the price of labor and material was about equal at the time each was built. If it had been possible to install the closed system at the same time the station was constructed the cost could probably have been reduced. As it stands, the comparison is, that the open system cost is about three times that of the closed system. A recent check shows that each could be built at the present time at a lesser cost, but that the ratio of cost would remain about the same.

There is an additional, though perhaps a fine point of economics involved in the use of exchanger systems. When the effect of heating the oil is considered in relationship to the quantity that can be pumped, it is quite probable that there is a definite saving in engine horsepower. This saving can be stated as a function of greater amount of oil that can be pumped at the same pressure as would be required were it not heated, or as the same quantity that can be pumped at a lesser pressure due to the oil being heated. The effect of heating the oil as it passes through the exchanger is, of course, manifest in the viscosity. Whether it is considered that the temperature rise is constant throughout the entire discharge line between stations, or that it is some mean temperature rise, does not alter the fact that it exists to some degree. The test reported in Table 1 shows that the oil incoming to the exchanger had a temperature of 46° F., and an outgoing temperature of 54° F. This change reduced the viscosity of the oil to such an extent that only 91.5 per cent of the horsepower was required to pump the oil at 54° as would have been required had the given quantity been pumped at 46°. From the indicated 8.5 per cent saving, the horsepower required to circulate the water must be deducted. This amount is small, being only about 2 horsepower. In the case of the two-pump installation, all of the indicated saving would no doubt be used up in the centrifugal pumps. The point is that the exchanger system does not appear to increase the horsepower requirements of the station. This cannot be said of the open system because all of the heat lost by the engine and absorbed by the cooling water is lost so far as any useful work in the system is concerned.

Water Losses

Those who would still adhere to the open gravity system and install it on the grounds that their water supply is cheap, unlimited and of good quality are in danger of making a serious mistake. In open reservoirs, spray ponds and cooling towers, the evaporation losses can easily vary from 3 to 10 per cent of the volume handled. This loss, of itself, is not serious where water is cheap and plentiful. It must be remembered, however, that the water lost through evaporation is pure water, and that the scale-forming solids, no matter how small in amount, remain in solution in the system. As make-up water is added, concentration is bound to occur. Finally, a system which was originally safe becomes so heavy with solids as to cause scale formations in the engine jackets. Scale removing and water treating compounds must then be used with the result that the station operation and maintenance costs are increased.

TABLE 2—QUANTITY OF COOLING WATER REQUIRED PER BRAKE HORSEPOWER
(Data obtained from same test as reported in Table 1)

Test No.	Rate of water flow G.P.M.	Rate of water flow Lbs.	Rate of oil flow, bbls. per day	Pumping pressure	B.H.P. load on engine	Per cent full load on engine	% heat absorbed by water	Pounds water per B.H.P.	Pounds water per B.H.P.*
1	93.4	778	17,174	692.5	243.6	60.9	37.5	192	180
2	76.0	633	17,830	697.5	254.6	63.6	36.5	149	148
3	54.3	452	16,978	697.5	242.5	60.6	37.5	112	112
4	48.8	406	17,698	700.0	253.7	63.4	36.5	96	95
5	44.5	371	17,107	700.0	245.2	61.3	37.2	90	85
6	35.8	298	17,698	700.0	253.7	63.4	36.5	70	70
7	35.8	298	17,765	700.0	254.7	63.6	36.5	70	70

*Computed from Formula 1.

Note—The average engine economy was assumed to be 0.45 pounds per brake horse power when using an oil having an average heating value of 18,500 B.t.u. per pound. The mechanical efficiency of the pump was assumed to be 83 per cent. Exchangers were two double return pass, connected in parallel and having a total cooling surface of 624 square feet. Water flows through the tubes and one-half of the flow is "parallel" to the cooling oil stream and one-half "countercurrent."

In order to select heat exchangers and pumps of the correct design it is necessary to determine the amount of cooling water required for individual engine operating conditions. One convenient formula in general use and reported by Morrison[2] gives the weight of water required per horsepower hour.

$$(1) \qquad W = \frac{xH}{100\ t_1 - t_2}$$

where:

W = Weight of water required per horsepower hour.
x = Percentage of heat absorbed by the water.
H = Total heat supplied to the engine per brake horsepower.
t_1 = Discharge water temperature.
t_2 = Intake water temperature.

In applying the formula it is of course necessary to know t_1 for the operating condition of the engine and this is best obtained from the manufacturer. Where this value is not definitely known it can be assumed from 115° to 130° F. Although engines have been safely operated at temperatures higher than 130°, the practice is not generally recommended. Outlet temperatures less than 115° should be avoided so far as possible for the reason that a greater quantity of water must be circulated to maintain the engine at this temperature than when higher values are used. Most engines do not run smoothly when the outlet water temperature is low and the point of best operation is usually found for temperatures ranging from 120° to 130°.

In choosing t_2 care must be taken not to make it too small. Since the difference between t_1 and t_2 is the B.t.u.'s each pound of water will absorb, it is evident that the greater the difference, the smaller the amount of water required. There is a practical limit to which this can be carried and under all ordinary conditions should not exceed 50°. This difference can be regarded as the temperature rise in the engine or as the drop in the exchangers. Since we are interested in the heat transfer that takes place within the exchanger, the difference will be regarded as the temperature drop; t_1 and t_2 must therefore be reversed in meaning.

t_1 = Temperature of water incoming to exchanger.
t_2 = Temperature of water outgoing from exchanger.

That amount of heat which is lost through radiation and conduction in the piping system cannot be predicted with any assurance and is therefore disregarded.

Heat Loss

The percentage of total heat, (x), supplied to the engine, that is absorbed by the cooling water is a function of the individual engine. An analysis of a large number of heat distribution tests furnishes a good basis for determining the amount of heat lost in this way. Figure 4 has been prepared as representative of average values for various engine loads. This curve is not intended to be absolutely accurate for all engines but it is believed that its use will give results within the limits of allowable error.

The total heat, H, depends upon the grade of oil used for fuel and its average heating value in B.t.u.'s per pound, as well as the economy of the engine under given load conditions when using this fuel. For example, if the engine has an economy of 0.48 pound of fuel per brake horsepower at 50 per cent load when using an oil having a heating value of 19,000 B.t.u. per pound, the total heat supplied per brake horsepower is 9,120 B.t.u. The percentage of heat absorbed by the cooling water, from Figure 4, is 41.

In order to test the dependability of the formula the amount of water per brake horsepower was computed, using the actual temperature drops as shown by the observed test data in Table 1. The weight of water actually used per brake horsepower was determined from the observed test data and these two results are given in Table 2. A comparison of these figures shows that they are in agreement, sufficient for all practical purposes.

It is obvious that the values of the variables in Formula 1 must either be known or assumed, and in this connection the manufacturer can be of material assistance to the purchaser by furnishing this data in detail. It is entirely possible that it has been furnished and not used, or that neither the purchaser nor manufacturer have considered the matter to be important. In any event, these values must be carefully determined if heat exchangers are to be designed and used to the best advantage.

Circulating Pumps

Centrifugal pumps are more satisfactory for handling the cooling water in exchanger systems than those of the piston type and are recommended for this service. The most frequent mistake made is that of selecting a pump that has a capacity much greater than is actually required for the low head at which it operates. In the centrifugal pump the head capacity characteristics can be controlled over a wide range by merely throttling the discharge. This gives a factor of flexibility to the system that is very desirable under varying engine load conditions. Some form of inclosed, lubricating stop for controlling the rate of flow is preferable to the wedge type gate valve for the reason that regulation is positive and quick. The most serious objection that can be raised against the use of the centrifugal pump is that it must be made self-priming. Since the surge tank is always placed several feet above the pump suction, this objection is overcome.

Opinions differ somewhat as to the best method for driving the circulating pumps. The writer favors the plan whereby each main unit drives its own circulating pump direct from the main transmission shaft, either by means of a chain, gears or a combination drive. In this way water circulation begins as soon as the engine starts. There is ordinarily less chance of pump failure on direct drives than where the pump must depend on a secondary source of power. A standby pump, either motor or auxiliary engine driven, and manifolded to the entire water system should be installed at multiunit pumping stations. This provision will guard against the danger of having a main pumping unit out of service due to the failure of its circulating pumps.

The coefficient of heat transfer curve shown in Figure 5 has been prepared from the observed test data given in Table 1. This curve will doubtless possess different characteristics for different types of exchanger design. That it is correct for the one particular exchanger on which the test was made is all that is claimed. Check computations using coefficients from this curve for determining the square feet of cooling surface in single pass countercurrent exchangers gave results that were quite accurate. In using this curve it is first necessary to compute the weight of water to be circulated per hour for a given temperature drop, which can be done by means of Formula 1. Knowing this rate the proper coefficient can be selected. The quantity of heat carried away from the engine in B.t.u.'s per hour is easily computed and by simple division the number of square feet of cooling surface obtained. It is to be hoped that further

(Continued on Page 50)

[2]American Diesel Engines; L. H. Morrison, McGraw-Hill Co., 1931.

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Operation of Automatic Pump Station

Interesting Observations Made on Installation at Main Line Station. Power Rates Are an Important Factor

By A. N. Horne, General Superintendent Empire Pipe Line Co.
Presented before Mid-Continent section, A.S.M.E., Tulsa, March 10

This will be a short review of development of the automatic pump station idea, and of one installation of such a station on a trunk pipe line, with some observations on actual operation.

About four years ago, the local section of the A.S.M.E. began a study of the possibilities of the automatic operation of pump stations. Representatives of the various oil pipe line and power companies pooled their ideas of what functions could be made automatic, and a theoretical station was designed embodying as many operating conditions as would be expected in operation. These various operating conditions were then fitted with automatic control, based on inherent factors, such as pressures, flow, temperature, etc.

A small station was set up at the International Petroleum Exposition in Tulsa in 1929, the equipment being loaned or donated by various manufacturers. The station aroused considerable interest and comment.

The study of automatic application was continued, and a more complete station was designed and installed at the exposition the following year. At the same time the subject of distant control of pump station equipment was studied, and fitted into the general scheme of inherent automatic operation with remote or supervisory control.

Trunk Line Installation

In late 1930 a trunk line booster station at Vinco, near Perkins, Okla., was converted to automatic operation with supervisory control. This station is described in an article in The Oil and Gas Journal, January 22, 1931. Coincident with this installation, another was made at a trunk line station at Sand Springs, Okla., described in The Oil and Gas Journal June 4, 1931. Other smaller installations have been made on trunk line and gathering line stations.

The station at Vinco, when first converted, consisted of two 4-inch three-stage centrifugal pumps, each driven by 2,300-volt, 3,600 r.p.m. motors. The line capacity is 40,000 bbls. per day at 800 pounds. The full line capacity was later required, and a third unit was added to the station in May, 1931.

The general layout of the line and sta-

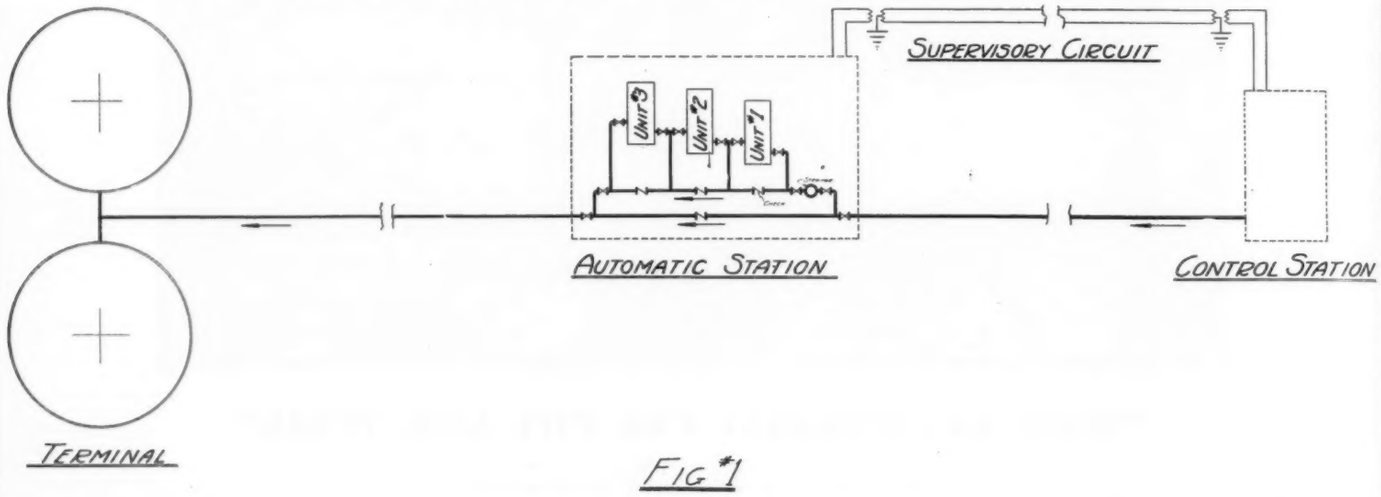

FIG #1

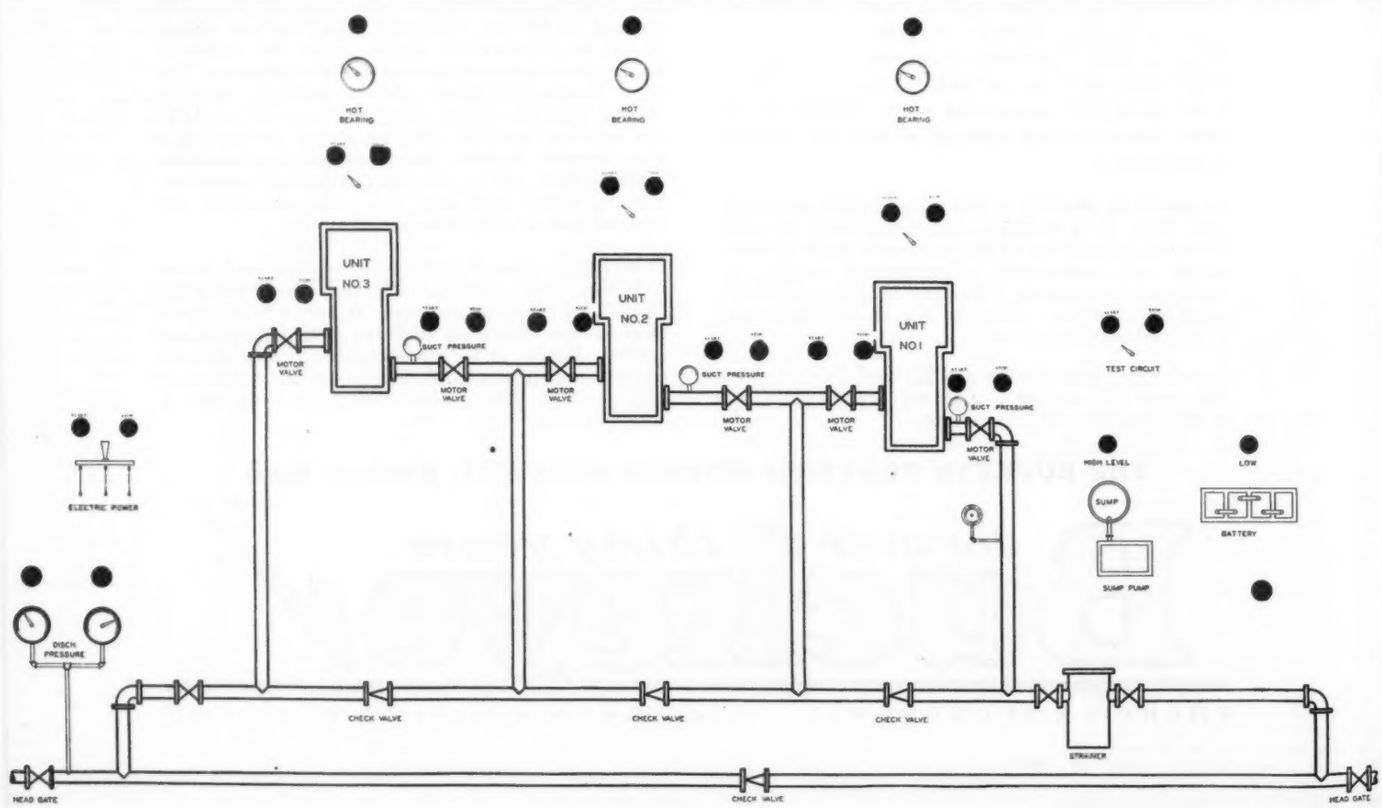

Figure 2.

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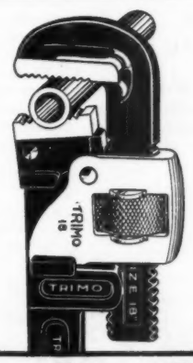
Exchange National Bank Bldg.
Tulsa, Okla.

Construction of
Oil and Gas Pipe Lines
City Gas Systems



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tions involved is diagrammed in Figure 1, and the station equipment and lines in Figure 2.

The supervisory panel at the control station is a pictured diagram of piping and equipment layout at Vinco, Figure 2, and each valve or set of valves, and each motor has tell-tale lights above it showing at all times whether open or closed, running or stopped.

The station design and control are such that any one pump unit may be operated alone, any two in series or all three in series. This is obtained by three control switches on the panel, one for each unit. Thus, closing switch No. 1 sends the necessary impulses to cause motor valves Nos. 1 and 2 to open simultaneously. When these gates are fully open, a pressure controlled relay starts the motor, and the check valves cause the stream to take the proper course. Likewise, switch No. 2 causes motor valves 3 and 4 to open, and a pressure relay starts the motor of No. 2 unit, thus putting the two units in series. The shut down of any unit is caused by reversing the switch which closes the suction and discharge gates of the unit, and the pressure relay causes motor to stop from lack of suction pressure.

A line break on the suction side will cause the station to shut down from lack of suction pressure, and give a signal to that effect.

Handling Leakage

Normal stuffing box leakage goes to a sump where a float controlled relay operates a small pickup pump and puts the oil into the suction side of the line. Excessive leakage, which could be caused by blown gasket or leak in pipe or fittings, causes a second relay at a higher level in the sump to send a signal to the control station.

So-called "smellers" to detect leaks have been experimented with, but nothing satisfactory devolved.

This station is equipped with two types of bearing temperature controls. One type has a stem immersed in a bearing well, with a lead to an indicating gauge in the control room. The gauge has contacts for control of relay to shut down the unit and send signal to the control station. The other type is a mercoid switch, integral with the stem immersed in the bearing well. This latter type is not satisfactory if there is any vibration present.

It appears that a temperature control with a fusible link element might prove more satisfactory, if the proper temperature range could be procured.

No provision is made for an alarm or shutdown in case of a fire, though several types of instruments have been considered.

A power failure, of course, shuts the station down and gives a signal at control station, both visually and by an alarm bell. A high pressure control at the control station also shuts down two units at that place.

This station originally had a flowmeter on the discharge side to take care of a line break on increased volume, but this installation was found to be of no value on a straight booster station operating at near zero suction pressure, because there would be no increase in the amount of oil from the preceding station. This meter was therefore removed.

A flowmeter would be of value for this purpose if the station were working out of tankage, or if operating at high suction pressure with centrifugal pumps at preceding station.

In the original design of the station, it was thought necessary to start a centrifugal pump against a closed gate, in order not to build up an overload or excessive demand. After operating for a period, it was found that it was not necessary to start against a closed gate on this setup as a straight booster station where the whole line was already filled. The complicated system of time delay relays which caused the discharge gate to open in steps at predetermined time intervals were dispensed with, thus simplifying operation considerably.

If starting against an empty line with unlimited supply on suction side, it would perhaps be necessary to use this delay system, which would hold the volume down until line filled and the pressure built up.

Shaft Stuffing Box

The shaft stuffing box on this type of pump has been quite a problem. This was designed to run with a considerable amount of oil leaking past the packing and gland in order to lubricate and keep cool. The grade of crude handled has a high floating sand content, and on the second and third units, when running in series, the cutting of shaft and packing has been very rapid. This problem has not been solved as yet.

These pumps have thrust bearings lubricated by the crude from the discharge through strainers. It was found necessary to design larger strainers to take care of a 24-hour run, so that a daily inspection would suffice for cleaning.

The conventional type of gate valve—wedge or double disc, is not entirely satisfactory for motor drive because of the extreme close adjustment required to shut off the power at exactly the right moment. The controls to these valves should be so designed that a movement, once started, can not be stopped or reversed until completed.

Perhaps the solution to this problem would be a satisfactory rotating plug-cock type.

For operation of motor driven valves 440 volts is not at all satisfactory in automatic or supervisory work, and 110 volts will be demanded in future installations.

Relays and Contacts

It has been proved conclusively at this station that all relays and contacts must be of a type not influenced by atmosphere, temperature, or dust, in order to be entirely dependable. They must not be susceptible to vibration or jars, or else must be protected against these.

Practically all cases of trouble have been traced to dirty contacts or slow acting relays.

The power for the control system is derived from storage batteries, and is therefore independent of the power system.

The original supervisory equipment of this station utilized the old type selectors used in telegraph and railway work, and requires very close adjustment and constant attention. This system could give false signals, because based entirely on the action of a polarized relay any break in the current flow of the control system would give a reversed signal on the board.

The action of the original supervisory system was sluggish, and at times signals would be out of step or proper sequence.

A manufacturer of automatic telephone equipment has designed and installed for trial and demonstration a control system using the standard products of their factory — nothing special, excepting the circuit. This latter control system has been installed and operated for nearly a year and has been found entirely satisfactory and dependable. The signal system is tested out daily whether the station is running or not.

Conclusions

Automatic station operation and supervisory control of one or more stations from a central point is practical, but the matter of power rates and availability will in the main be the governing factors in their installation.

The motivating idea in automatic station design was to make a saving on investment and operating costs.

Without entering into discussion on comparative costs on investment, interest, depreciation and taxes we can readily concede the advantages of these factors to the electric over the Diesel powered station. We can also concede advantages in operating labor and maintenance labor and material to the electric drive.

The power companies have made concessions in rates, but can they make further concessions in order to compete with lower costs of Diesel equipment, using gear drives and centrifugal pumps at total station costs of around $75 per installed horsepower, or $1.50 per barrel capacity.

CLOSED COOLING PLAN FOR DIESEL ENGINES

(Continued from Page 48-N)

tests will be made on actual installations and similar curves prepared in order that the detail of the more widely known formula can be simplified. A check of a number of exchanger installations shows that the cooling surface required per horsepower hour under widely operating conditions ranges from 0.75 to 1.25 square feet with a fair average at about 1 square foot. Those desiring a more theoretical discussion on heat transfer systems are referred to Lucke-Engineering Thermodynamics. The quantity of heat given up by the water, neglecting losses, must be equal to the heat carried away by the oil. For a given temperature rise in the oil, the amount necessary to carry away the heat of a given temperature drop in the water can be computed from the formula:

$$W_o = \frac{C_w W_w (t_{w_2} - t_{w_1})}{C_o (t_{o_2} - t_{o_1})}$$

where:

W_o = Weight of oil in pounds per hour.
W_w = Weight of water in pounds per hour.
C_o = Specific heat of the oil.
C_w = Specific heat of the water.
t_{o_1} = Initial temperature of the oil.
t_{o_2} = Final temperature of the oil.
t_{w_1} = Initial temperature of the water.
t_{w_2} = Final temperature of the water.

The large number of exchanger systems that have been installed and successfully operated during the past four years have done much to remove the element of doubt from the minds of many pipe line officials and engineers alike. The idea is no longer in the experimental class, but is firmly established as a thoroughly workable plan, which economically solves many of the troublesome problems that exist under the open gravity system.

There is little to indicate that the present interpretation of the fundamental plan will undergo any radical changes in the future. It is reasonable to expect that development will be along the lines of refinement in design, increased efficiency and economy, and will be brought about by a larger number of installations at pipe line pumping stations.

STATION NO. 1—INSTALLED COST OF OPEN TYPE, GRAVITY COOLING WATER SYSTEM
(Constructed in August, 1924)

Reinforced concrete reservoir, approximately 95,000 bbls. storage capacity	$9,382.25
1,000-bbl. bolted steel water tank	1,221.97
Steel water tower and foundation	811.89
Line pipe, fittings, incidental material and labor of connection work	1,585.00
Total	$13,000.21

The above installation is the conventional type commonly found at main line pumping stations. This system furnished the water supply for the auxiliary equipment and two 400 horsepower four-cylinder vertical De La Vergne engines connected to Goulds 6¼x24 23,000-bbl. pumps; one unit operating; one unit as standby.

STATION NO. 2—INSTALLED COST OF EXCHANGER COOLING WATER SYSTEM TO REPLACE OPEN TYPE GRAVITY SYSTEM
(Constructed January, 1930)

Two—400 sq. ft. return pass, water to oil heat exchangers	$1,623.10
Line pipe	290.10
Valves, flanges and fittings	511.80
3x12 single stage, horizontal belt driven centrifugal water pump	118.00
Pulley, belting, surge tank, supports, etc.	189.70
Thermometers, pressure gauges and water meter	105.92
Concrete work, miscellaneous material and incidental expense	306.70
Labor of installation	1,440.60
Total	$4,567.81

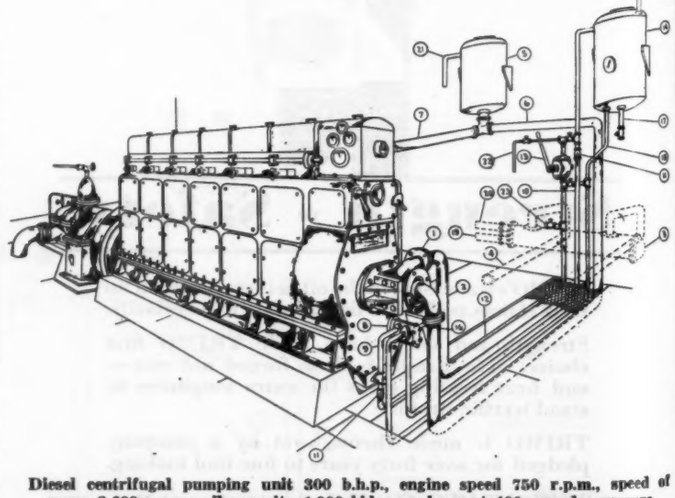
Constructed to replace conventional gravity system, substantially the same as given for Station No. 1, and to supply cooling water to one 300 horsepower two-cylinder horizonal De La Vergne engine connected to National Transit 5½x24 17,000-bbl. pump.

THE DIESEL DRIVEN CENTRIFUGAL UNIT

(Continued from Page 48-K)

ering stations, such installations being more or less temporary, ranging in life from two to five years, thus giving the user the benefit of low installation cost and continued low operating cost throughout the life of the station.

These figures do not include labor cost for operating which would amount to approximately $6,000 per year, and was not considered necessary for comparison of operating cost.



Diesel centrifugal pumping unit 300 b.h.p., engine speed 750 r.p.m., speed of pump 3,600 r.p.m., oil capacity 1,000 bbls. per hour at 400 pounds pressure.

1. Centrifugal water pump, 12-inch impeller. 2. Water discharge line to jacket water cooler. 3. Jacket water pipe line cooler, single pass. 4. Water supply line from water cooler to oil cooler and engine. 5. Surge tank, 50 gallons. 6. Suction line from surge tank to water pump. 7. Water discharge line from engine to surge tank. 8. Duplex lub oil pump, 17½ g.p.m. 9. Suction line from engine sump to duplex pump. 10. Lub oil discharge from duplex pump to overhead wall tank. 11. Check valves. 12. Lub oil hand pump suction line from engine sump. 13. Three-quarter-inch oscillating hand pump for lub oil. 14. 50-gallon lub oil wall tank. 15. Lub oil supply line from wall tank to duplex pump. 16. Lub oil line from duplex pump to oil cooler and engine. 17. Drain line for wall tank. 18. Vent line for wall tank. 19. 8-inch crude oil inlet from discharge line. 20. 8-inch crude oil outlet. 21. Make up water line for surge tank. 22. Priming line to be connected to line 16. 23. Fill line for new oil.

OKLAHOMA FIELDS

(Continued from Page 34)

Phillips Petroleum Co.; W. U. Paul, Acme Oil & Gas Co.; Ralph Roark, Shell Petroleum Corp.; A. V. Hoenig, Indian Territory Illuminating Oil Co., and J. R. McWilliams, Skelly Oil Co., have been in session several times discussing the conditions and policies in the Oklahoma City Field. The committee will report at a general meeting of producers on March 22.

Continental Oil Co. has issued orders to start construction work on its 10-car loading rack near its pump station, and it is expected the rack will be used to transport fuel oil which it has been acquiring from local refineries.

The proration order covering the last half of the month of March for the Oklahoma City Field is expected to be a continuance of the present order. Hearing is to be held by the Corporation Commission Saturday.

Three new locations were made in the Oklahoma City Field during the week in the north end of the field in the Wilcox sand zone, as the result of recent developments.

Anderson-Prichard Oil Corp.'s No. 2 Hill, SW cor. NW NE, Section 10-11-3w; Phillips Petroleum Co.'s No. 1 August, NE cor. SW SW NE, Section 3-11-3w, and No. 1 Trail, C S half SW SW NE, Section 3-11-3w, are new locations.

Ocate Oil Co.'s No. 3 Smith, NE cor. SE NW, Section 15-11-3w, a recent completion, was opened for its potential gauge and made 1,030 bbls. of oil in one hour from a total depth of 6,510 feet. Same company's No. 2 Smith, SE cor. NE NW, Section 15-11-3w, is waiting for cement at a total depth of 6,403 feet, in the Wilcox sand.

Anderson & Kerr and others' No. 1 Volk, NW cor. NW NW SE, Section 15-11-3w, showed for a large well when it flowed 936 bbls. of oil in 30 minutes, with 50,000,000 feet of gas a day. The 9-inch casing was landed at 6,401 feet and the total depth is 6,500 feet. The location was staked about a year ago and it remained shut down until the early part of this year.

In the southwest part of the field another well extended production to the west. Wellsley Oil Co. and Phillips Petroleum Co.'s No. 1 Cowell, NW cor. SW SW NE, Section 22-11-3w, found the Wilcox sand at 6,480-6,558 feet. The well will aid in proving the trend of production in this part of the field. It flowed 1,396 bbls. of oil in two hours, with an estimated 18,000,000 feet of gas a day. The well is located about a quarter of a mile north of the McArthur's No. 1 Pruitt, which extended production in the field to the west earlier in the week.

In the southeast corner of the same section Tom Slick Oil Co.'s No. 1 Dodd, SW cor. SE SE SE, Section 22-11-3w, flowed 5,089 bbls. of oil in four hours with an estimated 35,000,000 feet of gas a day. The oil was found in the Wilcox sand at 6,465-6,560 feet.

In the Fish Pool

Jarvis & Holms' No. 2 Fish, SE cor. NW NE, Section 30-7-8, Seminole County, was drilled deeper and increased its flow to 2,267 bbls. in 15 hours. The well was drilled from a total depth of 3,051 feet to 3,066 feet in the Wapanucka lime. The top of the pay was found at 3,005 feet. The south end of the Fish Pool is yielding the largest wells in the field.

Tulsa Oil Co.'s No. 1 Davis, NE cor. SW NE, Section 30-7-8, made 1,799 bbls. of oil in 24 hours from the pay at 2,990-3,052 feet. It may be drilled deeper.

Prairie Oil & Gas Co.'s No. 1 Maxey, NE cor. SW NW, Section 1-8-6, found production in the Wilcox sand at 4,130-44 feet. It was put on the air-gas lift and made 727 bbls. of oil in 24 hours. It has been shut in for the 16-day proration period.

Gypsy Oil Co.'s No. 5 Horn, NW cor. NE NE, Section 14-6-3, in the Wanette Pool, Pottawatomie County, was given a production test and made 700 bbls. of oil in 24 hours from the pay at 3,459-91 feet. The north offset, Mid-Continent Petroleum Corp.'s No. 3 Archer, SW cor. SE SE, Section 14-6-3, was shot with 20 quarts, at 3,521-31 feet and the hole bridged. It was cleaning out. It had the pay sand from 3,518-52 feet.

Stanolind Oil & Gas Co.'s No. 2 Jones, SW cor. SE NW, Section 20-9-6, in the West Seminole City extension area, made 1,721 bbls. of oil in 24 hours from the Calvin sand at 2,733-60 feet. It was cutting 7 per cent. This well will probably be shut in for 60 days under the recent agreement made by operators in the area.

Good Well in Hughes County

Mid-Continent Petroleum Corp.'s No. 1 Bruner, NE cor. NW SE, Section 9-7-8, in the Holdenville Pool, Hughes County, was blowing wild after a fishing job, which was later cleaned up and the well drilled deeper into the pay and it is now making 25 bbls. of oil an hour. The top of the gas pay was found at 2,900 feet, and the oil at 2,934-49 feet. It flowed 330 bbls. the first 15 hours. The fishing job late in 1931 delayed the completion of the well. It was estimated the well made 46,000,000 feet of gas a day at first and it was out of control for a week, the fishing job was overcome and the well was shut in, and later drilled deeper.

Tidal Sells More Strippers

The Tidal Oil Co. announced it has sold 400 stripper wells in Washington County to Fees and Hoyt, of Iola, Kans., during the week. The wells which have a settled production of 250 bbls. a day are located in the vicinity of Dewey. This is the second sale of stripper wells made by the Tidal Oil Co. in recent months, the others having been in Nowata and Rogers Counties, sold to Whitehill and Harmon.

Seminole Production

The production from the Greater Seminole area for the week ending March 11 was approximately 139,165 bbls. a day. The Seminole Field, which includes the first 12 pools listed below, averaged 101,990 bbls.

Pool—	Bbls.
Little River	18,225
East Little River	4,385
Carr City	11,085
Maud	2,065
Mission	5,880
Bowlegs	11,535
Earlsboro	12,915
South Earlsboro	1,835
East Earlsboro	12,300
Seminole	17,295
East Seminole	1,135
Searight	3,335
Total	101,990
Allen	9,395
Asher	545
Wanette	3,295
Konawa	4,585
Sasakwa	1,890
St. Louis-Pearson	17,465
Grand total	139,165

Carter County

H. L. Sturm and W. Gant's No. 1 Hooks, SW cor. Section 18-1s-2w, has been completed for 1,250 bbls. in broken sand at 1,975-2,015 feet, total depth 2,067 feet.

Cotton County

Wirt Franklin Petroleum Corp. is building the rig and moving in tools for No. 4 School Land, SE cor. SW Section 36-1s-10w.

Creek County

Gled Oil Co. and Elison's No. 1 Barton, NE cor. SE Section 36-19-8, is rigging up. Gled Oil Co.'s No. 1 Fish, NE cor. SE NW Section 7-19-9, is a machine rigging up. Gled Oil Co. and Phillips Petroleum Co.'s No. 9 Koch, NE cor. SE NE Section 20-19-9, is rigging up. Vensel & Elliot's No. 1-A Evans, NE cor. SW Section 28-19-9, is drilling at 1,000 feet. Magnolia Petroleum Co.'s No. 18 Musselman, NW cor. SW NW NE Section 8-18-7, has been deepened to 2,439 feet and now drilling out cement at 2,385 feet. Jim Wise and others' No. 1-A King, SW cor. NE SE Section 22-17-11, is spudding. Kirchner and others' No. 2 Strip, SE cor. SW SE NE Section 13-19-8, has been completed for 40 bbls. in Skinner sand at 2,250-95 feet, total depth 2,304 feet. Gled Oil Co.'s No. 1-A Thomas, SW cor. NE Section 8-19-9, has been abandoned at 2,397 feet. Roy Dean and others' No. 1 Lashley, NW cor. Section 19-19-9, has been completed for 15 bbls. in Skinner sand at 2,278-2,327 feet, total depth 2,348 feet. Gled Oil Co.'s No. 3 Hamilton, NE cor. NW NE Section 29-19-9, made 200 bbls. in Skinner sand at 2,125-67 feet. Bert Swift and others' No. 1-A Nave, SE cor. NW Section 1-18-8, had Red Fork sand at 2,386-2,416 feet, total depth 2,418 feet, and was completed for 35 bbls. H. E. Dowd and others' No. 1-A McIntosh, NW cor. NE NW Section 13-17-11, has been completed for 250,000 feet of gas in sand at 1,042-70 feet. Magnolia Petroleum Co.'s No. 10 Bruner, SE cor. SW SW Section 3-16-7, has been completed for 3,000,000 feet of gas in the Tucker sand at 2,625-38 feet.

Garvin County

Gabe Long and others made location for No. 1 Ward, NW cor. SW SE Section 19-1-2w.

Grady County

George Schoonmaker's No. 1 Staton, NW cor. Section 35-4-6w, is a rig.

Oklahoma County

Champlin Oil & Refining Co. and Hall & Briscoe's No. 6 Central, NW cor. SE SE Section 3-11-3w, Block 8, Central addition to Oklahoma City, is a cellar. Marion Oil Corp. has the cellar dug for No. 1 Rooke, SW cor. SE NW NW, Section 10-11-3w, Block 8, Chapin Levi addition. Indian Territory Illuminating Oil Co. made location for No. 1 Lord, SE cor. NE NE Section 35-11-3w. Gulf Producing & Refining Co.'s No. 1 Garrett Rucker, SW cor. SE SW NW Section 2-11-3w, has been completed for 2,182 bbls. in five hours from Wilcox sand at 6,227-82 feet. Refiners Production Co.'s No. 1 Buchanon, SE cor. SW NE Section 10-11-3w, had Wilcox sand at 6,332-95 feet, total depth 6,400 feet, and more 2,803 bbls. in four hours. Ocate Oil Co.'s No. 3 Smith, SW cor. NE SE NW Section 15-11-3w, has been completed for 4,792 bbls. in four hours from Wilcox sand topped at 6,410 feet, total depth 6,510 feet. Skelly Oil Co.'s No. 1 Ledbetter, CWL NE NW NE Section 22-11-3w, has been completed for 580 bbls. in four hours from Wilcox sand at 6,450-6,527 feet, total depth 6,533 feet. Harrell-Davis and others' No. 1 Fish, SE cor. NE SE SE Section 22-11-3w, topped Wilcox sand at 6,425 feet, drilled to total depth of 6,505 feet and made 1,550 bbls. in four and a quarter hours.

Okmulgee County

Alec Karam and Don Zimmerman moved a machine in for No. 1-A Kirschner, NW cor. SE SE Section 21-16-14.

Osage County

J. E. Cooper and others' No. 2, NE cor. SW SE Section 26-21-10, is dry and abandoned at 1,945 feet.

Pawnee County

Spartan Drilling Co.'s No. 3 Lederer, SE cor. NW NW Section 24-20-7, is dry and abandoned at 2,650 feet.

Pontotoc County

Stanolind Oil & Gas Co. is building the rig for No. 2 Burk "C", SE cor. SW NE Section 32-5-5, Bebee Pool. Gus Dalaney's No. 2 Harrell, CNL NE SE Section 29-5-8, is swabbing 50 bbls. from sand at 841-53 feet.

Seminole County

Prairie Oil & Gas Co. made location for No. 1 Foster, SE cor. NW NW Section 1-8-6. No. 1 Maxey, NE cor. SW NW Section 1-8-6, has been completed for 900 bbls. in sand at 4,129-35 feet after plugging back from 4,235 feet to 4,144 feet.

Stephens County

P. L. Gilbert is moving the tools in for No. 2 Green, SW cor. NE NE Section 2-2s-8w. Dun-Mar Oil Co.'s No. 1 Dunmar, NW cor. NE NE Section 11-2s-8w, has been completed for 7,000,000 feet of gas in sand at 1,358-90 feet.

Tulsa County

Aggas Drilling Co. has a machine on the location for No. 1-A Techorna, CWL SE NE Section 13-16-13.

MICHIGAN FIELDS

(Continued from Page 44)

No. 1 Corning, Section 2, Greendale Township, drilling at close to 2,000 feet, and also owned by McClanahan, about a mile north of the Struble well and a little east. The fourth test to be put down on the A. G. Struble farm, in Section 10, Greendale Township, probably will be completed within two weeks, barring hard luck. No. 4 test was drilling close to 2,500 feet. A location has been made for No. 5 on the same farm and should be drilling within a few days. Same party is drilling Nos. 3 and 4 on the Henry W. Morrison farm, No. 3 is located in the NE SW SE, Section 10, and No. 4 is in the SE SW SE, same section and farm.

The Pure Oil Co. is starting No. 2 Charles Mullett and others farm, NE NW NE, Section 15, Greendale Township, and No. 3 same farm, NW NE NE, same section; also starting No. 2 Emma O. Reed farm, SW NE SE, Section 10, same township. No. 1 same farm, is drilling.

In Clare County, the Mammoth Petroleum Co. has shut down its test on No. 1 Bothwell farm, Section 15, Hatton Township, at 4,088 feet, with no showing of either oil or gas, while John A. McKay's No. 9 failed to find gas at the expected level in the Marshall formation at 1,483 feet. This well is in the SW SE NE, Section 6, Grant Township, same county, and will be abandoned. The drilling outfit is being moved for No. 10 in the NW cor. of Section 6.

John C. Arthurs Co. reports a location for No. 2 on the Schug farm, in Vernon Township, Isabella County, where a well that showed an initial of 800 bbls. was drilled last year.

Drilling was renewed at 1,504 feet in the test of Mid-Bay Oil Co.'s No. 1 G. W. Patrick farm E half W half NE, Section 24, Midland Township, Midland County, 3½ miles east of Midland. This well has been shut down for a number of months.

Permits have been given for Nos. 1 and 2 on the State of Michigan property, SW SE SE, Section 10, Greendale Township, Midland County, to the Talbot Oil Co., and the Pure Oil Co. got a permit to drill No. 3-A Iosco Land Co., NW N half NW, Section 16, same township, and in the northwest corner of the lease.

KANSAS FIELDS

(Continued from Page 35)

has been completed for 500,000 feet of gas in sand at 522-34 feet.

Cowley County

Roth & Faurot's No. 1 fee, SW cor. SE Section 22-32-4, Lot 10, Block 14, College View addition to the city of Winfield, is a rig.

Edwards County

Mid-Kansas Oil & Gas Co. has moved the rig in for No. 1 Converse, SW cor. NE NE Section 30-24-18w.

Ellsworth County

Smith & Ash and others made location for No. 1 Stratman, NW cor. NE NE Section 12-17-10w.

Harvey County

D. R. Laucke and others made location for No. 1 Krehbiel, SW cor. SE NW Section 9-22-3w. McBride and others staked location for No. 1 Friesen, NW cor. SW Section 20-22-3w.

McPherson County

Derby Oil Co. and Empire Oil & Refining Co.'s No. 8 Domsch, SE cor. NE NW Section 6-20-1w, has been completed for 602 bbls. in Viola lime at 3,413-27 feet. Twin Drilling Co. and others' No. 1 Farver, SW cor. SE Section 16-20-1w, is dry and abandoned at 3,497 feet. Western Gasoline Corp. and Shell Petroleum Corp.'s No. 1 Wall, NW cor. SW SE Section 21-21-3w, has been completed for 125 bbls. in chat at 3,087-3,130 feet.

Reno County

Cromwell & Lewis made location for No. 1 Regier, C SE SE Section 24-23-4w.

Sedgwick County

Continental Oil Co. is building the rig for No. 1 Horton, SW cor. Section 10-25-1e.

FIXED REFINERY ASSESSMENT

CHATHAM, Ontario, Mar. 12.—Ratepayers of Anderdon Township this week by a vote of 172 to 32 approved the granting of a fixed assessment of $25,000 on the plant of the Simrall Refining Co. north of Amherstburg, which is now under construction.

Field Problems and Their Solution

EDITED BY THOMAS F. SMILEY

In order that men connected with the drilling, producing and transporting branches of the petroleum industry may procure quickly a solution of many problems confronting them from time to time in their work, The Oil and Gas Journal has arranged with leading engineers and other recognized authorities to answer questions submitted by readers of this publication pertaining to the work of drilling and producing crude oil and transporting this product.

Everyone is invited to submit questions freely. These questions will be submitted to proper authorities by Mr. Smiley, who edits the page, and answers, based on the best available information, will be published. Each question should give as much detail as possible, especially where it relates to matters where depths of sands, types of sands and operations on adjoining properties would have a bearing on the problem involved. The source of all questions will be considered as confidential and only initials will be published in connection with the question.

In this connection, The Oil and Gas Journal will be glad to publish articles from field men who have devised new methods or practices which are improvements.

In case an immediate answer is important, one will be given by mail if the writer requests it.

ACTION OF GAS ON PIPE LINE

We are especially interested concerning the action of gas on cement and the different types of natural gas lines in connection with this action. We would be grateful if you would advise us where we could secure literature pertaining to the different types of natural gas pipe lines.—M. S.

The action of gas, either natural or manufactured, upon cement depends on the percentage of hydrogen sulphide residing in the gas. A pure methane gas should have no deleterious effect whatever on cement. Most natural gas, however, is not pure methane and its tendency to disintegrative action will rise in direct proportion to its sulphur content.

Steel, wrought iron and "spiralweld" pipe is used in the construction of natural gas lines, and what has been said of the effect of gas on cement is true also of metal pipe lines. As a matter of fact few natural gases contain excessive quantities of hydrogen sulphide and generally speaking the corrosive action of natural gas as you find it in pipe line systems throughout the country is almost negligible.

It is difficult to refer you to any literature bearing specifically upon the point with which your question deals. You will find of interest in this connection an article by Dr. C. K. Francis in The Oil and Gas Journal of March 5, 1931, "Characteristics of Hydrogen Sulphide," and one in the issue of January 1, 1931, by Ralph E. Davis and Lyon F. Terry, "Design of High-Pressure Gas Lines." The annual Pipe Line numbers of this periodical contains articles on the most recent developments in pipe line construction. The latest of these special numbers was published June 4, 1931.

OFFSET WELLS AND THE LAW

I am part owner and manager of a good well in East Texas, but have had no experience in the oil game. Could you tell me how to go about it to obtain from the United States Government pamphlets explaining the geology of petroleum?

I recognize the logic and sense of the law compelling a leaseholder to drill necessary offset wells to protect the interest of royalty holders. It seems to me, however, that the proration in effect and a very small amount of oil taken from any one well under such proration should operate against this fundamental law of royalty protection and that the law should be applied with much greater liberality than was the case when, and is the case now, where no limitation is placed upon the flow of oil from any well. Will you kindly indicate whether such modification of the offset law ever has been given serious consideration, and if it has can you indicate how I can ascertain the grounds or arguments upon which the proposal was defeated?—E. C. H.

You can obtain free from the Section of Publications, U. S. Bureau of Mines, Washington, D. C., a copy of "List of Publications, Bureau of Mines, 1910-1931, with an Index by Subjects and Authors." From this list you can select what you want. You would do well to obtain also a good work on petroleum geology. There are several such books adapted to your needs.

There are a great many angles to the question of drilling contracts required under oil leases and it is suggested that you write to Earl Oliver, Ponca City, Okla., for reprints of his recent papers published in The Oil and Gas Journal on this general subject.

This department does not know of any attempt being made to enact a law in any state governing the drilling of offset wells. The lease requirements govern drilling conditions and there are usually two implied convenants in an oil lease which operate for the benefit of the royalty owner. These are the implied obligation imposed on the lessee to drill offset wells and to develop the leased premises with "due diligence." The necessity for an offset well and what constitutes due diligence in operating are questions of fact to be determined by the court and jury under the circumstances in each particular case.

It is apparent that the strict enforcement of these lease obligations may, and often does, compel unnecessary or uneconomic drilling in order to protect the leases. This results in a direct benefit to the royalty owner who shares no operating expense, but is concerned solely with the maximum amount of production obtained in the shortest possible time.

In the case of Brewster vs. Lanyon Zinc Co. (1905) 140 Fed. 601, it was decided that "no obligation rests on the lessee to carry the operations beyond the point where they will be profitable to him, even if some benefit to the lessor will result from them. . . Whatever in the circumstances would be reasonably expected of operators of ordinary prudence, having regard to the interest of both lessor and lessee, is what is required." Permit laws, regulating drilling, are now being introduced in several states to control operations.

So far as information in hand goes the obligation upon the lessee is covered entirely by the contract he makes with the lessor and no state or federal law has been enacted that would have any bearing upon offset drilling. It is suggested that you discuss your lease with your attorney, for it is a legal document and he should be able to give you competent advice on its limitations.

Mr. Oliver is well versed in law having to do with the production of oil and gas in all states and you may be sure he will be glad to answer legal points you care to raise. Also if you will read carefully the series of articles he has prepared on unit operation you will find them interesting and enlightening. You will find in The Oil and Gas Journal from time to time articles about conditions in the East Texas Pool that will be of special interest to you and we assume that you are following them.

PIPE LINE TEMPERATURES

What are the winter and summer temperatures of oil in pipe lines and how does rainfall affect these temperatures? To what temperature is treated oil heated in order to make it merchantable?—J. K.

The temperature of oil in pipe lines varies with climatic conditions. In the Middle West and Mid-Continent areas, in which presumably you are more particularly interested, 40 degrees above zero is close to the average temperature throughout the cold winter months and 70 degrees is near the average throughout the summer. Unusual weather conditions may send the temperature to 30 degrees in winter and well above 70 in summer. In Texas 55 degrees for winter and 80 for summer are a fair estimate of the averages, though here again weather conditions play an important part. A temperature of 50 degrees sometimes is reached in winter.

Rainfall has a marked effect on temperatures of oil in the line where the ditch is freshly filled, and always it has a noticeable effect where the line traverses cultivated ground. Rain that soaks through the newly filled trench may cause a difference of several degrees in temperature of the oil, but no specific figures are available. The shallower the ditch, the more marked the effect of rain, of course. After the earth above the pipe becomes hard-packed it is so nearly impervious to water than rains have little or no effect on the temperature.

Oil is subjected to temperatures of 110 to 120 degrees in the process of heat-treating, but it usually is cooled to at least 90 degrees before being introduced into the line.

WHY WAS IT CALLED THAT?

NAPHTHA

The Second Book of the Maccabees, one of the apochryphal books of the Bible, reveals the probable origin of the word "naphtha." When the Jews were about to be taken from Palestine to Persia they "found pits in which the priests concealed the sacred fire they required for their sacrifices." Many years later their descendants, contemporaries of the Prophet Nehemiah (or Neemias), returned to Palestine and searched for the hidden fire. They "found no fire, but thick water." This "thick water," when poured upon the hot sacrificial stone, ignited and sent up a column of flame.

"And Neemias," the chronicle goes on to say, "called this thing naphthar, which is as much as to say a cleansing, but many men call it nephi." The book adds, "Then the king, enclosing the place, made it holy after he had heard the matter."

CONCERNING MADISON LIME

Is the formation known as the Madison lime in Alberta, Canada, present in Oklahoma or Texas? What relation has the Wilcox sand of Oklahoma to the Dakota sands of Colorado and Wyoming? Is the Dakota formation present in the Panhandle area?—H. C. P.

The only reference at hand to the Madison limestone of southern Alberta is in a paper by J. S. Irwin, and published by the A.A.P.G. in a book entitled "Stratigraphy of Plains of Southern Alberta," from which the following is quoted:

"There is little reason for argument concerning the nomenclature of the pre-Cretaceous formations. Accordingly, the highest Paleozoic limestone, known in southern Alberta only from its occurrence in the few deeper bore holes, is named the Madison, and the Jurassic beds which lie, so far as known, with slight angular discordance, on the eroded surface of the Madison are termed the Ellis formation. Fossils indicate that the Ellis is in part equivalent to the Sundance formation of southern Montana and Wyoming and the Fernie of the Alberta foothills."

The Madison limestone is of Mississippian age and there seems to have been no correlation made of it with other limes of that age found in Oklahoma and Texas. You understand that there are Mississippian limes in Oklahoma, but so far as available records go there has been no correlation between them and the Madison lime of Alberta.

The Dakota group of Salt Creek anticline is given as of Cretaceous age, while the Wilcox sand of Oklahoma is classified as of Ordovician age.

While the area of the Panhandle of Texas does show Permian and Pennsylvanian age rocks at the surface there also are rocks of Tertiary age in the vicinity of Amarillo at the surface, and it is therefore possible that some Dakota sand is in the region, but so far as known it never has been identified and mapped. This is because it would be in the upper part of the geological series as found in the Panhandle district and no attention is paid to it by the driller. It is quite certain that the Dakota sands are not productive in the Panhandle area.

BOOTLEG PACKER

Attention has been called to a discussion of the term "bootleg packer" on this page in which it was said that the device was so called because of its resemblance to a bootleg. This explanation of the name's origin is questioned, with the statement that pioneer oil-well drillers made a packer out of a bootleg and that the name continued to be applied to packing devices invented long after boots had become as obsolete as the spring-pole.

Investigation indicates that this latter explanation of the origin of the name is the right one. Dr. Henry Erni says in his "Coal Oil and Petroleum," published in 1865: "The primitive style of seed-bag, an old bootleg filled with flaxseed, which expands when wet, is still used. A better invention is demanded—one that will not provokingly give way just at the wrong time, to the delay of the works and serious loss to the owners. These seedbags, I remark for the benefit of those who may not know the meaning of the term, are contrivances let down the hole, outside the tube, for the purpose of keeping back the air or water or stopping some little crack in the rock through which the drill has passed. A bootleg, filled with flaxseed, was found to answer the purpose, hence the name. Oil men will hail with delight a new invention which will be certain to do the work and be less bungling and more easy to manage."

Personal Paragraphs About Oil Men

Willis Storm, of Dallas, Tex., has moved to San Antonio, Tex.

* * *

B. D. Jones, consulting geologist, has moved to Corpus Christi, Tex.

* * *

Errol J. Hesser, Pure Oil Company, formerly of Lake Charles, La., is now in Houston, Tex.

* * *

W. H. Vaughan, Gulf Refining Company of Louisiana, Shreveport, La., is now located at Houston, Tex.

* * *

A. C. McGahhey, who has been operating in West Texas till recently, is now in Southwest Texas and staying at Laredo.

* * *

William Hines, of Denver, Colo., one of the organizers of the E. T. Williams Oil Company, was in Casper, Wyo., recently visiting old friends.

* * *

Paul S. Ache, formerly president and general manager of the Reiter-Foster Oil Corporation, will drill on acreage which he recently took over in West Texas.

* * *

J. S. Smith, sales engineer, of the Byron Jackson Company, of Los Angeles, Calif., has been looking over the prospects for business in the Rocky Mountain territory.

* * *

E. J. Sullivan, president of the E. T. Williams Oil Company, has returned to Casper, Wyo., after having been absent in Washington, D. C., in the interest of his company.

* * *

W. M. Howard, superintendent of operations of the Ohio Oil Company in the Rocky Mountain region, and Mrs. Howard have returned to Casper, Wyo., from a trip to Craig, Colo., and Denver.

* * *

H. N. Wassung, a member of the Standard Oil Company's pipe line department, has been transferred from the Kettleman Hills district to the company's Taft office in the Midway-Sunset area, California.

* * *

L. G. May, of Santa Fe, N. Mex., district manager of the Southern Union Gas Company, accompanied by Sydney Johnson, of the legal department, and H. L. Ketchum, both of Dallas, Tex., have been inspecting the company's properties in northwestern New Mexico.

* * *

Mr. and Mrs. John McFadyen, accompanied by their daughter, Mrs. Dorsey E. Straitiff, left Casper, Wyo., for Findlay, Ohio, where they were called by the serious illness of Merle Poe, general counsel for the Ohio Oil Company. Mrs. Poe and Mrs. McFadyen are sisters.

* * *

Harry Bossart, division superintendent at Billings, Mont., for the Midwest Refining Company, was in Casper, Wyo., on company business Mr. Bossart's headquarters were at one time in Midwest, Wyo., and he was then sent to Casper as assistant to George H. Jacques, vice president and general manager.

* * *

G. E. Green, geologist, with the Vacuum Oil Company at the San Angelo, Tex., office, since the merger with the Standard Oil Company of New York, has been transferred to the office of the Magnolia Petroleum Company in San Antonio, business of the Vacuum in Texas having been transferred to the Magnolia company.

* * *

Ford Turner, scout for the Pure Oil Company, formerly of San Antonio, Tex., now of San Angelo, and Miss Martha McCutcheon are to be married March 26 at the ranch home of the bride's parents, Mr. and Mrs. B. B. McCutcheon at Fort Davis, Tex. Miss McCutcheon is a graduate of the University of Texas and Mr. Turner of the Ohio Wesleyan.

H. E. Lemar, of Tulsa, is in Southwest Texas scouting over the various centers of activity.

* * *

P. G. Weidner, manager of the gas department of Midwest Refining Company, has returned to Casper, Wyo., after a business trip to Denver.

* * *

C. H. Roberts, general sales manager for South Chester Tube Company, at Chester, Pa., is making an extended trip throughout the entire Southwest fields.

* * *

E. L. DeGolyer and Alfred Jacobson, president and vice president, respectively, of the Amerada Petroleum Corporation, arrived in Los Angeles, Calif., several days ago on a business visit.

Men of the Industry

Albert N. Horne

Albert N. Horne, general superintendent of the Empire Pipe Line Company, was born in Matherville, Miss., in 1894, and at the age of 10 began working between school periods in sawmills, of which there were many in his native State. He continued this throughout his college years, gaining practical experience in all phases of the long-leaf yellow pine lumber industry, including the log camps, logging railroad, planing mill, shipping, office and commissaries. He graduated from Mississippi A. & M. College in 1918 and at once entered the United States Army tank corps.

Upon his discharge from the army in 1919 Mr. Horne entered the employ of the Meridian Light & Railway Company, Meridian, Miss., a Cities Service Company subsidiary. He was transferred later to the Doherty training school in Bartlesville, Okla., with the Empire Companies. Completing the training course the young man took a job with the Empire Pipe Line Company, first as a laborer and then as a field gauger in the Mid-Continent territory. Promotion to district foreman followed, in the Duncan, Burkburnett, Ponca City and Cushing Fields. He was made superintendent of operations in 1927, with headquarters in Bartlesville, and two years later became general superintendent.

Mr. Horne is a captain in the reserve corps of the United States Army and he goes to Fort Sill, Okla., every year or so for the two weeks' training period. Although he enjoys golf, hunting and fishing, his best-loved hobby is his home workshop where he has a wide assortment of tools with which he spends many hours. He is a member of the Hillcrest Club and the Mallard Gun Club, of Bartlesville.

John F. Weinzierl, consulting geophysicist and geologist, Houston, Tex., has returned from an inspection trip in Florida.

* * *

W. L. Christiana, of Denver, Colo., formerly chief geologist of the Continental Oil Company, has returned from a business trip East.

* * *

Ed Buckley, oil operator, Tampico, Mexico, has been visiting in Houston, Tex., calling on friends among the various Gulf Coast operators.

* * *

A. Outwater, president of the Tankers Corporation, New York City, paid a semipleasure and business trip to Houston, Tex., and the Gulf Coast.

* * *

C. R. Hetzler of Rock Springs, Wyo., general manager of the Mountain Fuel Supply Company, was in Casper, Wyo., conferring with officials of the Ohio Oil Company.

* * *

G. M. Aldahl, an independent producer having production in California fields and the East Texas area, has returned to Long Beach, Calif., on a short business trip.

* * *

J. A. Wales, McColl-Frontenac Oil Company, Montreal, Canada, spent several days in Houston, Tex., acquainting himself first-hand with oil conditions in Texas.

* * *

S. P. Wallace, in charge of the sales force for the Parkersburg Rig & Reel Company, East Texas Field, made a short trip to his home in Tulsa last week from Longview, Tex.

* * *

George B. Morgan, president, and Claude E. Aikman, vice president of the Cardinal Oil Company, at San Angelo, Tex., were business visitors at Shreveport, La., last week.

* * *

Art O. Olson, president and general manager of the Olson Drilling Company of Tulsa, was in Casper, Wyo., several days on business. He traveled by plane, accompanied by his pilot.

* * *

Sidney K. Keoughan, head of the Mutual Oil Syndicate, which is developing Midway Dome north of Casper, Wyo., has returned to Casper from Denver and will make his headquarters at Henning Hotel.

* * *

J. M. McIntire, vice president and general manager of the New York Oil Company and the North Central Gas Company, accompanied by other officials of the company, attended a managers' meeting in Bridgeport, Nebr.

* * *

R. A. Brooks, of the General Petroleum Corporation, and J. J. Patterson, of the Rio Grande Oil Company, led the general discussion on the proper distribution of city and county taxes on the books of a corporation before the last monthly meeting of the Petroleum Accountants Society held in Los Angeles, Calif.

* * *

C. E. Olmsted, vice president and general manager of The Texas Company and vice president of the California Oil and Gas Association, proved an able pinch hitter at the association's annual meeting in the absence of President J. A. Brown, of the General Petroleum Corporation, who was taken ill several days before the meeting.

* * *

A. R. Wilson, manager of the western division of the producing department of The Texas Company; L. J. Daly, division superintendent, and Hugh A. Stewart, geologist in charge of lands and leases, all of the Denver, Colo., offices, and K. D. Pardee of Billings, Mont., district superintendent of the Wyoming-Montana division, met in conference in Casper, Wyo., after which Messrs. Wilson and Stewart left for Calgary, Alberta, for a conference with officials of the Imperial Oil Company regarding joint tests near Lethbridge.

Natural Gas Industry Developments

NATURAL GAS SUPPLY FOR ST. LOUIS BY APRIL

Laclede Gas Light Co., St. Louis, Mo., which has filed with the Missouri Public Service Commission rate schedules for mixed natural and manufactured gas, estimates the new rates would save St. Louis gas users $617,000 a year. Of this amount $522,374 will apply to the domestic consumers, $59,142 to domestic heating consumers and $35,504 to industrial users of gas. Company officials estimate that revenues of the gas company will be reduced $7,581,579 to $6,694,557.

The Laclede company plans to obtain its supply from the Missouri Industrial Gas Co., which, like the Lacle company, is a subsidiary of the Utilities Power & Light Corp. According to the present plans the Mississippi River Fuel Corp., which constructed a pipe line to St. Louis about two years ago, will furnish the gas to Missouri Industrial Gas Co.

The minimum charge under the new rate schedule is 75 cents, with additional charge of 1.5 per therm for delayed payments.

Domestic heating service will be charged for according to cubic foot of building volume, 45 cents per 1,000 feet and a secondary rate of 6 cents per therm of all gas used in excess of the initial amount.

E. P. Gosling, newly elected president of the Laclede company, estimated that adjustment of gas burners can be made and the gas turned into the mains by April 1, if the new schedule of rates is adopted. He said gas for household use will be furnished on the therm basis rather than the cubic foot. The charge for the first two therms will be 80 cents; for the next 28 therms, 14.1 cents; for the next 300 therms, 11.2 cents; and all over 930 therms, 9 cents.

NEW EL PASO RATES

A new rate schedule has been put into effect in El Paso, Tex., by the Texas Cities Gas Co. According to Henry C. Morris, president of the company, during the first year of natural gas service in El Paso his company lost $107,141. The average customer used 3,500 feet a month of manufactured gas, for which he paid $5.25. The equivalent in natural gas service would be 1,800 feet, costing $2.55. An analysis showed consumers in El Paso using 3,000 feet or less per month are served at a loss. The new schedule, which applies to consumers of more than 3,000 feet, will effect a reduction to approximately 85 per cent of the customers during the year.

OKLAHOMA SERVICES

Talihina, Okla., hopes to have natural gas service in the near future from a new well 3 miles east, which is producing an estimated 1,000,000 feet daily. John Bailey, who drilled the well, plans to start several others.

Andy McInturff, of Okmulgee, a gas producer, has been voted a franchise to distribute natural gas in Hoffman, Okla. Charles Ramstead, of Okmulgee, a plumber, has held the franchise and served Hoffman for several years. Mr. McInturff has gas productions in the Hoffman area.

PITTSFIELD, ILL., SERVICE

Panhandle Illinois Pipe Line Co., subsidiary of Panhandle Eastern Pipe Line Co., is reported planning construction of a natural gas extension from its main line to serve Pittsfield, Ill., with gas. It will be operated by the Central Illinois Public Service Co., Springfield, Ill.

MONTANA COMMISSION ANNOUNCES HEARINGS

CASPER, Wyo., Mar. 12.—Montana Railroad Commission has announced a hearing in Billings on April 12 on the prices of natural gas for industrial and domestic consumption as fixed to patrons by the Billings Gas Co. The Billings Gas Co. is affiliated with the Ohio Oil Co. Officials of the gas company have been co-operating with the commission and civic organizations of Billings in preparing data. The Gallatin Gas Co. which transports the gas from Elk Basin to Billings has also been made a party to the hearing. From Billings the commission will go to Miles City for a hearing on the complaint of Norman Gray and others against the Montana-Dakota Power Co. attacking natural gas rates for that city. The commission also has set a hearing for April 7 at Sweetgrass for inquiry into rates charged by the Consumers Gas Co. at Ferdig, Oilmont, Sunburst, and Sweetgrass.

WACO TAX PROCEEDING

WACO, Tex., Mar. 14.—City Attorney John McGlasson has been instructed by the city commission to proceed at once with the collection of penalties aggregating, it was said, approximately $209,000 from the Texas Cities Gas Co., distributor of gas in Waco. It is based on the fact that the company has failed, it is claimed, to file annual reports for the last three years, the penalty for failure being $100 a day. This action follows tender by the Texas Cities Gas Co. of Texas on its Waco holdings in a sum nearly $8,400 less than that demanded by the city of 1931 valuations, the tender being refused by the city.

REFUSED RATE INCREASES

AUSTIN, Tex., Mar. 14.—The Texas Railroad Commission has refused application for immediate natural gas rate increases to domestic consumers in Munday, Knox County, and in Atlanta, Cass County.

The Stamford & Western Gas Co. asked the commission to accept bond and suspend the rate now effective in Munday. The Southern Cities Gas Co. of Shreveport, La., made a similar application affecting rates in Atlanta. The commission refused to accept bond and alter the rates in each case, leaving existing charges in effect pending final determination of the applications on their merits.

MINES MENACE GAS LINE

CHATHAM, Ontario, Mar. 12.—A peculiar situation has developed in the Edmonton area where mains of Northwestern Utilities, Ltd., supplying Edmonton from the Viking gas field, are reported to be menaced by threatened subsidence of old coal mine workings on the Fraser Flats. For some time an engineer has been investigating and the company has taken the matter up with the Edmonton city council and the Alberta Public Utilities Commission. In view of the danger, formal application has been made for permission to abandon the service in this area.

MONTANA GAS FOR MINNESOTA?

Little Falls, Minn., is investigating the proposal of the American Gas Construction Co., Minneapolis, to serve that town with gas. The plant and distribution system would cost about $100,000. It is reported the company has formed an affiliation with a natural gas company interested in bringing a gas transmission line from eastern Montana.

MISUSE REGULATION SAYS FRANK L. CHASE

The trend of regulation of public utilities is causing increasing restrictions to be placed upon them, as in the case of railroads, and is extending to other utilities, said Frank L. Chase, vice president and operations manager for the Lone Star Gas Co., at the luncheon of the Dallas Technical Club.

"Pressure is being placed on the government to secure its responsibility for railroad bonds," said Mr. Chase. "The pressure is going to be so great in the railroad field that the government probably will have to take over the railroads.

"If there is going to be regulation there should be responsibility. If you are going to undertake to tell me how much I shall charge for a thing you should protect me from charges which will prevent my receiving a fair return on my property. This is losing force in the public mind. The public is quite indifferent as to whether a utility is a profitable utility or not.

"I am a firm believer in the principle of regulation of public utilities if fairly and properly conducted, and if conducted along the line under which regulation was originally conceived. I have seen regulatory bodies established in a great many states. In every case they start most logically with the idea that regulation is for the fair and proper consideration of every subject as between the utility and the people. After it goes on you will find that the regulation usually becomes of a restrictive nature, and it even appears that the public mind is drifting toward a view where restriction instead of regulation is what is actually desired."

REGINA GAS FRANCHISE

CHATHAM, Ontario, Mar. 12.—The Regina, Saskatchewan, city council at a recent meeting deferred a decision on the application of the Power Co. of Canada for a natural gas franchise until February 29. Some months ago the company made tentative arrangements for a franchise, and recently competitive proposals have been made to pipe gas from the Turner Valley and Wainwright Fields in Alberta.

CUT BANK DRILLING

CASPER, Wyo., Mar. 12.—Since the East Helena, Mont., smelters have hooked to the pipe line from the Cut Bank Field in northern Montana and brought the demand to 90 per cent of the available supply, it is expected the O'Neil interests will be forced to start another drilling campaign soon north of the town of Cut Bank. Recent reports are that at least 40 wells will be drilled.

NO ELECTION NEEDED

COLUMBIA, Mo., Mar. 14.—The Columbia city council declined to place upon the ballots for the April city election the proposition authorizing the Missouri Utilities Co. to switch from artificial to natural gas. The gas company has asked amendment of its franchise, but the council took the view that the company has power to substitute natural gas for artificial whenever it so desired.

BASSANO SEEKS GAS

CHATHAM, Ontario, Mar. 12.—The town of Bassano, in southern Alberta, is endeavoring to interest the Canadian Western Natural Gas, Light, Heat & Power Co. of Calgary, or other natural gas interests, in a project to drill for gas to supply the town.

FIND GAS IN TREES TO LIGHT CIGARETS

The presence of inflammable gas in trees is a phenomenon not exactly new to foresters, according to R. R. Reynolds of the United States Forest Service, who says that there may be a few who still "have their doubts."

During timber growth studies in Hempstead County, Arkansas, last summer, out of a total of about 100 bottom-land hardwoods measured and bored, at least 22 showed the presence of gas, writes Mr. Reynolds in Forest Worker. In eight instances the gas emitted by these trees was plentiful enough to burn when a lighted match was applied at the handle of the increment borer.

"In two different trees," he says, "the gas was under such pressure that it came out literally 'with a bang.' The first time this happened it so startled the man doing the boring that he jumped away from the tree. The noise sounded like the discharge of an air rifle and was heard at a distance of 60 feet. When a lighted match was held to the head of the increment borer through which the gas was issuing the gas immediately caught fire. The flame, which was pale blue in color, shot out about 5 inches beyond the end of the instrument and burned for about two minutes. During this time a cigarette was lighted from it.

CANADIAN WESTERN GAS

CHATHAM, Ontario, Mar. 12.—The Canadian Western Natural Gas, Light, Heat & Power Co. of Calgary in 1931 increased the customers on its system from 23,083 to 23,496. Due to the exceptionally mild winter the total revenue was lower, sales aggregating 6,494,917,000 feet bringing $2,017,228.53, against $2,199,049 in 1930. The average rate obtained for gas was 30.06 cents per 1,000 feet.

The company, which supplies Calgary, Lethbridge and a number of other communities in southern Alberta, has sources of gas supply in the Turner Valley, Foremost, Bow Island and Barnwell Fields. In 1931 practically all requirements were met by Turner Valley. Geological exploration for new fields is being continued. In 1931 a total of 4.02 miles of mains was added in cities and towns and 491 new services were connected.

After deducting operating and maintenance expenses, depreciation, etc., the profits for 1931 were $529,492.30, compared with $599,492.20 in 1930.

MISSOURI GAS EXTENSION

SPRINGFIELD, Mo., Mar. 14.—Authorization to sell $300,000 worth of preferred stock, given by the Missouri Public Service Commission to the Springfield Gas & Electric Co., will result in an immediate expansion program of the corporation's facilities here, E. S. Willver, assistant general manager announced. Extension of the natural gas lines, especially to the neighborhood where the new $3,000,000 federal hospital is being erected, is planned by the company.

PEACE RIVER FRANCHISE

CHATHAM, Ontario, Mar. 12.—Ratepayers of the town of Peace River, Alberta, by a vote of 125 to 8 approved the granting of a 10-year natural gas franchise to A. W. Bletcher and associates of Lethbridge. The Bletcher syndicate is planning to drill for gas on the east side of the river near the town. No. 1 test to spud in this spring. Drilling machinery is to be on the ground by May 1 and drilling under way by July. The franchise calls for at least 5 miles of mains to be laid by October, 1933.

Technical Questions Answered

BY CHARLES K. FRANCIS, PH.D., TECHNICAL EDITOR

This department of The Oil and Gas Journal is devoted to the manufacturing branches of the oil industry.

Those connected with the refining of crude petroleum, the manufacture of natural gasoline and closely allied industries are invited to submit their problems to Dr. C. K. Francis, technical editor. The department was created for the purpose of aiding managers, superintendents, engineers, chemists and all those engaged in the various phases of plant operation; also those connected with the marketing and utilization of petroleum products.

Questions should be submitted in as much detail as possible so as to assure a satisfactory answer.

All inquiries should be signed and if other than the given initials are to be used please indicate the desired letters.

Questions involving patented processes, intricate formulas, and calculations and estimates of costs, for obvious reasons, cannot be answered. The replies will appear on this page within a reasonable time.

LUB OIL QUALITY DEPENDS ON REFINER

What class of crude oils is considered to be the best adapted for making the better lubricating oils?—A. C. D.

It is generally admitted that the origin of the crude oil, as to classification on the basis of composition, has little to do with the quality of the lubricating oils that may be made from it. The important and essential factor is the process used and the care observed by the refiner.

The New York University of Business Research has recently completed a survey covering the quality of lubricating oils, in which opinions were obtained from professors of chemistry, automotive experts and executives. The conclusions expressed in this survey give this information:

A good lubricating oil has a number of functions, such as long life through heat resistance, maintenance of oil character, control of oxidation, control of carbon, high viscosity and low cold pour test, according to 72 per cent of the engineers who answered the question. Of this number, 70 per cent declared that properly refined lubricating oils may perform the basic functions of a good lubricant, regardless of the crude or crudes from which they are derived.

Ninety-nine per cent state that lubricating oils derived from the same crude may differ in their qualities; 89 per cent that lubricants from different crudes might be nearly or absolutely alike in their qualities, and 91 per cent that the crude source of a lubricant is not important so long as the refined oil possesses the chemical and physical qualities which are desirable for the use intended for it.

That the automotive industry is not dependent upon any particular source of crude oil for high quality lubricants is indicated by the statement of the majority of the authorities, "that the physical and chemical characteristics, and therefore the quality of petroleum lubricants, depend on the processes of manufacture and not on the crude from which such lubricants are made."

WRIGHT AND SCHNEIDER AVIATION ENGINES

Have you the details of the original Wright Brothers engine as compared with one of the highest type aviation motor of the present time? The horsepower, weight and speed are of special interest with any other information you have.—S. C. H.

The application of the internal combustion engine, by the Wright brothers in 1903, to the solution of the problem of mechanical flight depended largely upon the low weight of the engine. All details of the early engine are not available but the essentials are known, so lacking figures may be estimated. In the table following the comparison is made from the available data of the Schneider Trophy and Record engines of 1931.

WRIGHT BROTHERS AND SCHNEIDER ENGINES

	Wright Bros.	Schneider Trophy	Schneider Record
Horsepower	12-15	2,350	2,500
Weight, lbs.	240	1,630	....
Weight per H.p.	16 lbs.	11 oz.	....
R.p.m.	850	3,200	....
Bore, inches	4	6	....
Stroke, inches	4.25	6.6	....
Compression	3.5/1	10/1	....
Speed, m.p.h.	40	....	408

The first experimental flights of the Wright Brothers were made at Dayton, Ohio, December 13, 1903. Many public flights were made during 1908 and after numerous inspections and trials the first plane was delivered to the United States Government in 1909.

The Wright Brothers took advantage of the fuel gasoline which in 1903 was attracting attention by the designers of automobile engines. It is now recognized that special modified fuels are essential to maximum performance of the aviation engine. The fuel reported to be used in the flights with the Schneider engines was a mixture of gasoline, benzol, alcohol and tetraethyl lead.

U.G.I. GAS OIL SPECIFICATIONS

Have you the details of the specifications covering the grade of gas oil known as U.G.I. gas oil? How is this oil used? —L. C. W.

The U.G.I. (United Gas Improvement Co.) specification for gas oil is of a broad character as to distillation range, which is that 85 per cent must be recovered between the distillation temperatures of 400° and 700° F. Total sulphur shall not be over 0.5 per cent and coke not over 0.5 per cent. Since gas oil is a secondary product obtained when refining petroleum either by direct distillation or by cracking, it may vary in its properties. Wide variations in the distilling range are not desirable, the best quality being a close cut, virgin gas oil, fractionated when distilling the crude petroleum for the first time. Oils that have been reduced to the extreme are liable to contain large quantities of wax, indicated by the pour test, which yield objectionable deposits of coke in the gas making process.

There are two general methods used in making gas. In one a bed of burning coke is brought to incandescence by blowing air through it and at this stage steam is admitted. The water gas made at this stage has a heating value of around 300 B.t.u. per cubic foot. This product is enriched by adding the gas made from gas oil by passing the low B.t.u. gas through a chamber (carburetor) containing material held at a high temperature while oil is sprayed on the hot surface. The mixture of gas and oil vapors is then conducted through a second chamber where it is superheated to produce a fixed gas. The heating value of this gas runs from 550 to 600 B.t.u.

A second method, making use of what is known as the all oil water gas process, does not introduce air, but the gas oil is steam atomized through a hot mass, which has been prepared by burning oil. If desired the gas made in this way may be further enriched by oil gas, as in the enrichment phase of the first method. The final product has a heating value of approximately 700 B.t.u.

In addition to the indicated properties above mentioned, a good grade of gas oil may show the following:

Gravity, A.P.I.	32-38
Flash, min.	170°F.
Fire	250°F.
Pour test	zero–45°F.

Sometimes color and odor are inserted as specifications for gas oil to be used for the manufacture of artificial gas, but this is not good practice as such properties have nothing to do with gas volume and heating value, and may cause a premium to be paid over the prevailing market price.

TREATING METHODS FOR GASOLINE AND KEROSENE

Could you furnish an outline of the several chemical methods that are used in refineries for purifying gasoline and kerosene?—M. S. E.

Gasoline is made in the refinery from two different materials, by direct distillation from the crude oil and by the synthetic treatment of distillates and residuals involving distillation from the charge which has been heated to a high temperature while under pressure. Gasoline made direct from the crude oil is known as straightrun and that from the pressure stills is called cracked or synthetic gasoline.

Straightrun gasoline usually needs but very little treatment to bring it within the recognized specification for the commercial product. The substances to be removed may include traces of acids and certain sulphur compounds. Sometimes all that is required is to treat the product with small quantities of caustic soda, and seldom is it necessary to do more than apply what is known as the doctor treatment. This is an alkaline solution of litharge, the reaction being assisted with the addition of a small quantity of sulphur. This method is also known as the sweetening operation.

The distillate from the pressure stills is known as pressure distillate. This usually requires treatment with sulphuric acid to remove tarry matters and substances that have an objectionable odor. After treatment with the acid the product is distilled, the distillate being blended with the straightrun gasoline to make the final product. Very often the distillate from the pressure distillate is blended with the required quantity of straightrun and this passes through the sweetening process. There are numerous modifications of the process above outlined the modifications usually being confined to quantities and concentrations of the chemicals.

Many refiners handle a high grade crude oil which contains large quantities of gasoline and is practically free from impurities. When a crude oil of this type is refined the kerosene will seldom need any other treatment than that of sweetening for the better grades of kerosene. When the kerosene distillate is heavy and dark colored it will have to be treated with sulphuric acid as outlined for pressure distillate.

The operations outlined are the common ones extensively used. Other processes are in use. The steps are about the same. In one chlorine, or some compound of chlorine, is used for the treating of high gravity gasoline. Another makes use of liquefied sulphur dioxide in place of the acid. A process in which zinc chloride is the treating chemical has recently been announced. In some plants the gasoline vapors are treated in the vapor phase by passing the hot vapors through fuller's earth or certain prepared clays, or the clay material may be mixed with the oil and passed through the furnace at a high velocity.

EFFECTIVE LIMITS OF OIL FILMS

An oil film to be effective must keep the moving surfaces apart. What is known as to the weight which will cause this film to break down?—W. E. R.

Effective films of lubricating oil must vary with type of oil, metal surface and temperature with increase of pressure. Mougey and Allen describe, in The Oil and Gas Journal, November 12, 1931, page 109, friction tests of high loads with different lubricating oils in a testing machine. The method is to rotate a journal at 100 r.p.m. with a constantly increasing load of 1,000 pounds per square inch until a total load of 25,000 pounds per square inch is reached or seizure occurs. The assembly being immersed in the oil under test. A 200 viscosity at 210° oil shows a low friction up to 10,000 pounds per square inch, at which point the oil film fails.

Other experiments reported by L. J. Bradford, in a bulletin of the Pennsylvania Grade Crude Oil Association, show that an oil film 0.0002 inch thick supporting a weight of 400 pounds per square inch developed an oil pressure of 1,400 pounds per square inch.

By increasing the weight upon a revolving bearing, it was found that the maximum compression of the oil rose faster than the weight. One hundred pounds of weight upon the test machine resulted in a maximum of 250 pounds to the square inch compression in the oil film. But a weight of 400 pounds produced a maximum oil film pressure of 1,400 pounds to the square inch.

Although almost too thin to be visible, the film at this compression completely separated the two metallic surfaces. At weights above 400 pounds to the square inch, the oil film began to break down and allow the metal faces to rub each other.

EMULSIFYING AGENTS

What substances are suitable for making emulsions with petroleum lubricating oils?—W. L. H.

An emulsion consists of very finely divided globules or droplets, frequently of minute dimensions requiring a microscope for their measurement, so dispersed in a mixture that there is no appreciable separation upon standing. There are two types, oil in water and water in oil.

The stabilizing agents for oil in water emulsions include albumin, acacia, agar, gelatin, Irish moss, sea-weed, lecithin, tragacanth and numerous soaps. Insoluble materials include koalin, infusorial earth, fuller's earth, calcium and magnesium oxides and carbonates, and cadmium sulphate.

Emulsions of the water in oil type make use of mineral soaps, including calcium, magnesium, lead, nickel and zinc compounds. Rubber, paraffin wax, beeswax and other waxes, also various resins, together with asphalt and carbon black are used in many preparations of this sort.

Preparations of emulsified oil for internal use incorporate the edible gums with white oil. The more inert materials and mineral soaps are used in the emulsions of the regular lubricating oils, such as certain cutting oils.

WILDCAT OPERATIONS IN LOUISIANA-ARKANSAS

(Continued from Page 36)

DE SOTO PARISH

E. T. Oakes' No. 1 R. H. Bryant et al, 200 ft. N and W, SE cor. NE NW, Sec. 30-13-15 ..... Drlg. 3,315 ft.
A. R. Smith's No. 1 Horn, Sec. 16-12-16, NE cor. Sec. ..... Rigging up.
Rellitt Oil Co.'s No. 1 Ganno hrs., 300 ft. S and E, NW cor. NW NE, Sec. 12-11-16 ..... S.D. 1,965 ft.
A. A. Tutin's No. 1 Mickie, Sec. 7-13-12 ..... Derrick.
Walters-Nicholson, tr.'s No. 1 Jim Guy, Sec. 3-11-13 .... Reaming to bottom 1,785 ft.

MOREHOUSE PARISH

United Gas Public Service Co.'s No. 2 Sandidge, Sec. 11-20n-4e, 656 ft. S, 1,332 ft. W, NE cor. NW ..... S.D. 2,132 ft; high wtr.

NATCHITOCHES PARISH

Dr. H. S. Gerson's No. 1 Smith, Sec. 11-10-8, 2,000 ft. N, NE cor. of irregular Sec. 10, in Sec. 11 ..... S.D. 585 ft.
Dr. H. S. Gerson's No. 2 Smith, Sec. 11-10-8, 200 ft. N and 300 ft. W of NE cor. ..... Location.
Cooper et al's No. 2-A Cooper, C SE SE, Sec. 32-11-10 .... S.D. 1,518 ft.
R. A. Keaton's No. 1 Stephens, Sec. 25-10-6, 320 ft. N and W, SE cor. NW NW ..... S.D. 178 ft.
C. M. Talley et al's No. 1 C. M. Talley, 1,980 ft. W, 660 ft. S, NE cor. SE, Sec. 29-11-10 ..... S.D. 1,380 ft.

OUACHITA PARISH

J. J. Potts, agent's No. 1 Robinson-Reed, Sec. 11-18-4e,
Wilson & Mitchell's No. 1 Williams, Sec. 5-16-1,e 330 ft. E, 240 ft. S, NW cor. SW SE ..... Coring 2,760 ft.

RED RIVER PARISH

La. Oil Dev. Co.'s No. 2 La. Delta Pecan Co., 2,950 ft. S, 300 ft. E, NW cor., Sec. 27-13-11 ..... Spudded and S.D. 50 ft.

RICHLAND PARISH

National Gas Co.'s No. 1 Singletary, 1,980 ft. N, 660 ft. W, SE cor., Sec. 20-18n-7e ..... S.D. 2,515 ft.

SABINE PARISH

Baird & Hunter's No. 1 Petty, Sec. 11-7-11 ..... Set 10-in. 101 ft; drlg. 960 ft.
Baird & Stone's No. 1 McNeely, Sec. 14-7-11 ..... Completed flowing 246 bbls. at 2,493 ft.
Beene et al's No. 1 Ezernack, Sec. 2-7-13, 1,070 ft. S, 250 ft. W, NE cor. ..... S.D. 1,650 ft.
Baird & Stone's No. 1 Quayhaglen, Sec. 11-7-11 ..... Set 10-in. 100 ft.
Coates Pet. Co.'s No. 1-B S. S. Martinez, Sec. 3-7-13, 330 ft. S and W, NE cor. SE NE ..... Location.
W. M. Coates' No. 1 Stille, 330 ft. N, 660 ft. W, SE cor., Sec. 35-8-13 ..... Derrick.
W. M. Coates et al's No. 1 Mansfield Hardwood Lbr. Co., Sec. 36-8-13, SW cor. SE SE ..... W.O.S.R. 2,403 ft.
B. A. Ferrell's No. 1 Haley, Sec. 6-7-12, 300 ft. S and E, NW cor. NW SW ..... Set 10-in. 103 ft.
Frank Foster, Inc.'s No. 1 Stephens, Sec. 20-9-11, 330 ft. S and W, NE cor. NW NW ..... Blowing wild 20,000,000 ft. gas at 3,358 ft.
R. L. Gay, tr.'s No. 1-A Long Bell Lbr. Co., 430 ft. S, 200 ft. W, NE cor. NW NW, Sec. 10-8-13 ..... Reaming 4,441 ft; T.D. 4,788 ft.
T. M. LeGrand's No. 1 Peterson, 330 ft. N and E of C, Sec. 34-7-13 ..... S.D. 2,243 ft.
Geo. LeGrand's No. 1 McGough, Sec. 3-8-10 ..... Derrick.
J. J. Keen, tr.'s No. 1 Belton (no check), Sec. 31-9-13 .... S.D. 2,875 ft.
A. D. King, tr.'s No. 1 Germain, Sec. 7-7-10, 330 ft. E, 518 ft. N, SW cor. NE NE ..... Derrick.
E. F. Neely's No. 1 Cobb & Alford, Sec. 14-7-11, 200 ft. S, 100 ft. E, NW cor. NE SW ..... W.O.S.R. 2,565 ft.
Palmer & Smitherman's No. 1 La. Long Leaf Lbr. Co., Sec. 12-7-11, 330 ft. S and E, NW cor. NE SE ..... Location.
Palmer & Smitherman's No. 2 La. Long Leaf Lbr. Co., 330 ft. S and W, NE cor. NE SE, Sec. 12-7-11 ..... Location.
Palmer & Smitherman's No. 3 La. Long Leaf Lbr. Co., 330 ft. S and W, NE cor. NE SW, Sec. 12-7-11 ..... Location.
H. W. Perritt's No. 1 Brown Lbr. Co., Sec. 6-7-10, 330 ft. N and E, SW cor. SW SE ..... Drlg. 1,800 ft.
Rowe et al's No. 1 Williams, Sec. 13-7-11, 600 ft. S, 40 ft. E, NW cor. SW ..... Rigging up.
Scully & Beach's No. 1 Lafitte, Sec. 13-7-11, 100 ft. S, 660 ft. E, NW cor. NW ..... Derrick pattern.
H. R. Smith et al's No. 1 La. Long Leaf Lbr. Co., Sec. 12-7-11, 330 ft. S and W, NE cor. NW SW ..... Drlg. 100 ft.
H. R. Smith et al's No. 2 La. Long Leaf Lbr. Co., 330 ft. N and W, SE cor. NW SW, Sec. 12-7-11 ..... Location.
J. E. Smitherman's No. 1 Smith, Sec. 7-7-10, 330 ft. S and E, NW cor. NW SW ..... Swabbing 2,811 ft.
Southland Drlg. Co.'s No. 1 Frank Martinez, 330 ft. S and W, NE cor. NW, Sec. 11-7-13 ..... Hole full S.W. 2,525 ft.
Southland Drlg. Co.'s No. 2 F. Martinez, Sec. 11-7-13, 330 ft. S and E, NW cor. NE NW ..... Derrick pattern.
Southland Drlg. Co.'s No. 1 Gilbert Martinez, Sec. 2-7-13, 330 ft. N and W, Sec. cor. SW SW ..... Derrick pattern.
Southland Drlg. Co.'s No. 1 C. E. Patterson, Sec. 2-7-13, 330 ft. N and E, SW cor. Sec. ..... Tested dry; W.O. 2,505 ft.
A. F. Tarver's No. 3 Cutrer, Sec. 12-7-11, 1,120 ft. E, 300 ft. N, SW cor. NW ..... Derrick.
The Texas Co.'s No. 1-B Grauque, Sec. 10-7-13, 330 ft. S and W, NE cor. SE ..... Tested dry; W.O. 2,490 ft.
A. H. Thames' No. 1 Edward est., 150 ft. NW SE cor. NE SE, Sec. 8-8-13 ..... S.D. 1,200 ft.
C. H. Tuttle's No. 1 Travis, Sec. 13-7-11, NE NW ..... Location.

TENSAS PARISH

A. R. Willis et al's No. 1 Currey, 1,320 ft. S, 1,320 ft. E, NW cor., Sec. 39-11-12 ..... S.D. 3,545 ft.

ARKANSAS

COLUMBIA COUNTY

Kendall Oil Co.'s No. 1 Fullenweider, Rhea & Kitchen, Sec. 13-17-22 ..... S.D. 814 ft.

CLAY COUNTY

S. C. Jeffus' No. 1 Underwood, 510 ft. N, 350 ft. W, C, NW SE, Sec. 4-20-8 ..... S.D. 1,350 ft.

CLEVELAND COUNTY

Crum & Stillwell's No. 1 E. R. Bell, Sec. 10-10s-12 ..... Rigged up and S.D.

CLEBURNE COUNTY
(Cable tools)

Donnelly-Craver et al's No. 1 Donophan Lbr. Co., SE cor. NW, Sec. 33-11-9 ..... S.D. 3,740 ft.

DALLAS COUNTY

J. H. James, tr.'s No. 1 Fordyce Lbr. Co., 200 ft. S, 200 ft. E, NW cor. SE, Sec. 11-9-15 ..... Coring 2,514 ft.
Zepp O. & G. Co.'s No. 3 Hillman, Sec. 20-10-13, 180 ft. N, 450 ft. E, SW cor. NW NE ..... Location.

DREW COUNTY

Co-Operative Dev. Co.'s No. 1 Ogles, Sec. 35-15-5, 330 ft. S and E, NW cor. NE NW ..... S.D. 1,890 ft.

HOT SPRINGS COUNTY

Star Oil Co.'s No. 1 Cunningham, 285 ft. S, 285 ft. W, NE cor., Sec. 11-5-16 ..... Washing to bottom 1,300 ft.

LINCOLN COUNTY

Lawrence Cook, tr.'s No. 1 McGhee Planting Co., 420 ft. S, 200 ft. W, NE cor. NE SW, Sec. 5-8-7 ..... S.D. 2,800 ft.

LITTLE RIVER COUNTY

Roberts Oil Co.'s No. 1 H. J. Russell, 330 ft. E, 330 ft. S, NW cor., Sec. 25-12-19 ..... Location.

LOGAN COUNTY

J. H. Flowers' No. 1 J. H. White, Sec. 13-6-26 ..... S.D; W.O. 3,570 ft.

MILLER COUNTY

W. E. Noel et al's No. 1 Dickson hrs., 1,980 ft. W, 660 ft. S, NE cor., Sec. 11-20-27 ..... S.D. 1,955 ft.

OUACHITA COUNTY

Copenhaven et al's No. 2 Berg, C SE SE, Sec. 13-15-17 .. S.D. 2,011 ft.
McLean et al's No. 1 L. D. Neely, Sec. 23-15-16, 200 ft. N and W, SE cor. NE SW ..... Began Mar. 2; drlg. 102 ft.

PIKE COUNTY

E. R. Henderson's No. 1 Tilyou, 660 ft. W, 500 ft. S, NE cor. NE SE, Sec. 26-8-14 ..... T.A. 2,909 ft.
E. R. Henderson's No. 1 J. L. Lee, 400 ft. S, 350 ft. E, NW cor. SW SE, Sec. 31-8-24 ..... S.D; W.O. 1,020 ft.
E. R. Henderson's No. 1 W. B. East, 200 ft. S, 150 ft. W, NE cor., Sec. 13-9-23 ..... Coring 2,037 ft.

PRAIRIE COUNTY

Powell Creek O. & G. Co.'s No. 1 Kloss, NE SW, Sec. 3-4n-6w ..... Partly rigged up and S.D.

SCOTT COUNTY

Heavener O. & G. Co.'s No. 1 Riser, Sec. 36-4-26 ..... S.D; T.D. 1,436 ft.
Waldron O. & G. Co.'s No. 1 White, NE cor. SW NW, Sec. 17-3n-29 ..... S.D. 1,860 ft.

SEVIER COUNTY

Tristate Oil Co.'s No. 1 Grimble, Sec. 34-8-22, S½ SW .. S.D. 950 ft.

ST. FRANCIS COUNTY

Field & Jones No. 1 F. M. White, Sec. 1-4n-2e, SW cor. NW ..... Rigging up.

UNION COUNTY

Drillers Oil & Dev. Co.'s No. 1 Pickering, 220 ft. N, 668 ft. E, SW cor. NW NE, Sec. 1-17-16 ..... T.A. 2,134 ft.
Drillers Oil & Dev. Co.'s No. 1 Haynie, Sec. 1-17-16, 200 ft. S, 300 ft. E, NW cor. NW SE ..... Rigging up.
H. H. Helms' No. 1 C. H. Murphy, NE cor. NW NE, Sec. 31-16-14 ..... Reaming 2,450 ft.
L. M. Hill et al's No. 1 J. W. Barnes, Sec. 21-19-16, NE cor. Sec. ..... Derrick.
Sunby et al's No. 2 Perdue, Sec. 33-16-14, 75 ft. S, 150 ft. E, NW cor. Sec. ..... Whipstocked and set 6-in. 1,[illegible] ft; drilled to 1,850 ft.
Wilson & Chapman's No. 1 King, Sec. 3-18-13, 330 ft. N and E, SW cor. NE NE ..... Derrick.
Wilson & Chapman's No. 1-A D. Norman, 330 ft. S and E, NW cor. N½ NE SE, Sec. 3-18-13 ..... Derrick.
Wilson & Chapman's No. 1 K. D. Parker, Sec. 3-18-13, 330 ft. N and E, SW cor. S½ NE SE ..... Drlg. lime 2,835 ft.

WASHINGTON COUNTY
(Cable tools)

C. H. Willoughby's No. 1 Jones, Sec. 34-16-30 ..... S.D. for funds 1,795 ft.

YELL COUNTY
(Cable tools)

Tegmeier & Luckett's No. 1 Falcon, Sec. 36-7-21 ..... S.D. 5,710 ft.

EAST TEXAS

BOWIE COUNTY

Logan & Elliott's No. 1 Smith, 9,600 ft. S, 2,500 ft. W, NE cor. Chas. Lewis Sur. ..... S.D. 4,505 ft.
Tarkington & Jones' No. 1 W. W. Whybark, 200 ft. S, 200 ft. W, SW cor. J. H. Dyer Sur. ..... S.D. 1,880 ft.
Lee Timberlake et al's No. 2 Tidwell, 2,510 ft. N, 655 ft. W, SE cor. T. M. Rice Sur. ..... S.D. 3,000 ft.

CASS COUNTY

J. F. Morrisey's No. 1 T. J. Wilson, 1,088 ft. S of N line, 2,376 ft. E of W line of H.R.S., J. R. McFarland Sur. ..... S.D. 3,670 ft.
Davis & Pigg's No. 1 Roy Bryan, SW cor. Roy Bryan 88-ac. tr., Albert H. Lattimer Sur. ..... S.D. 2,860 ft.
William S. King's No. 1 D. W. McDonald, Martha Ingram Sur., 688 ft. W, 1,343 ft. N, SE cor. Lot 5, McDonald 61-ac. tr. ..... Abd. 2,265 ft; crooked hole; sk[illegible] ding over.
C. E. Murdock's No. 1 First National Bank, Evans Watson Sur. ..... S.D. 4,390 ft.
John C. Rogers' No. 1 I. E. Lanier, 573 ft. N, 879 ft. W, SE cor. Lanier 86 ac. in K. E. Welborn Sur. .... S.D. 2,280 ft.
Olds & King's No. 2 Anthony, John C. Byers Sur. .... S.D. 1,760 ft.
John C. Rogers et al's No. 1 W. Q. Henderson, 3,100 ft. S, 3,100 ft. E, NW cor., Wm. Davis Sur. ..... S.D. 960 ft.

HARRISON COUNTY

Lloyd Oil Corp.'s No. 1 E. S. Timmons, 150 ft. from N line to 250 ft. from E line of 105-ac. tr., Findley Sur. ..... S.D. 4,195 ft.
Ryan Cons. Pet. Corp.'s No. 1 J. M. Fuhr, 1,300 ft. N of NW cor. T. J. Copelin Sur., 1,675 ft. SW at right angles to NW SE line of O'Neal Sur. ..... Derrick.

MARION COUNTY

Baunoch Dev. Co.'s No. 1 Miller, 725 ft. N, 1,470 ft. E, SW cor. H. Fulgram Sur. (was Gist, Claunch & Dodson) ..... Coring 2,932 ft.
Geo. Hindeman et al's No. 1 F. V. Lindsey, 2,500 ft. S, most northerly N line, 3,555 ft. E most easterly W line, Alexander Albright Sur. ..... S.D. 2,380 ft.

PANOLA COUNTY

Hoffer et al's No. 1 Cameron Lbr. Co., center 1,306-ac. tr. in W. M. A. LaGrove Sur. ..... Derrick.
Moses & Wallace's No. 1 Daniel, 600 ft. N and W lines, Mrs. Gerrell 100-ac. tr., SW cor. Isabel Hanks Sur. .. Spudded and S.D.
G. A. Davidson's No. 1 Latham, Wm. Rich, Sur. ..... S.D. 2,394 ft.
J. L. Nelson et al's No. 1 J. W. Williams, 300 ft. S, 700 ft. W, NE cor. Williams' 67-ac. tr. in James Hanks Sur. ..... S.D. 3,055 ft.

RED RIVER COUNTY

D. M. Buffington's No. 1 Hossler, E. Hughhart Sur. .... S.D. 2,795 ft.
Johnson Pet. Co.'s No. 2 Randolph, Edw. Dean Sur. .... S.D. 2,280 ft.

SHELBY COUNTY

Carter & O'Brien Bros.' No. 1 Frost-Johnson Lbr. Co., 200 ft. S, 150 ft. W, NE cor. 168-ac. tr., Aaron Castleberry Sur. ..... Location.
Chapperell Oil Co.'s No. 2 Holt, Matthew Moore Sur. ... Coring 3,180 ft.
Harry Elliott's No. 1 Pickering Lbr. Co., 1,000 ft. N, 150 ft. E, SW cor. 361-ac. tr., G. H. Patterson Sur. .. Swabbing 1,508 ft.
K. H. Francis' No. 1 John Mims, Mary Smith Sur. .... S.D. 3,334 ft.
H. H. Gracey's No. 1 J. A. Morrison, 1,500 ft. N, 200 ft. E, SW cor. J. A. Morris' 109-ac. tr., William English Sur. ..... S.D. 2,600 ft.
Henry Mauilding's No. 1 Frost Lbr. Co., NE cor. Frost Lbr. Co.'s 80-ac. tr., A. D. Fountain Sur. ..... S.D. 3,246 ft.
McRoby et al's No. 1 Windham, Wm. Leach Sur., on Windham 296-ac. tr. ..... S.D. 3,393 ft.
Ridgeway et al's No. 1 Polley, Domingues Gonzales Sur., 3,130 ft. E of SW cor., 160 ft. N at right angles of Polley 457-ac. tr. ..... S.D. 822 ft.
C. H. Tautenhahn's No. 1 J. C. Bogard, 300 ft. S, 900 ft. E, NW cor. J. C. Bogard's 52-ac. tr., Thomas Baker Sur. ..... S.D. 20 ft.
Western World's No. 1 Foster, Billingsby-Jeremiah Bowlin Sur. (was Stephens et al's No. 1 Foster) ..... Drlg. 2,250 ft.

LOUISIANA-ARKANSAS PROVEN AREAS

(Continued from Page 36)

W. F. Lacey's No. 2 McNeely, 550 ft. E, 330 ft. N, SW cor. NE NE, Sec. 14-7-11 ..... Tested dry; W.O. 2,453 ft.
Zeke Lohman's No. 1 McCormick, 660 ft. E, 330 ft. N, SW cor. NE SW, Sec. 2-7-11 ..... Set 6-in. 2,357 ft.
Loring Oil Co.'s No. 18 Bowman-Hicks, 1,280 ft. S, 275 ft. E, NW cor. SW NW, Sec. 15-7-12 ..... Coring 4,595 ft.
Ben Merritt, tr.'s No. 2 Byrd, Sec. 1-7-11 ..... S.D; W.O. 2,579 ft.
Pelican Nat. Gas Co.'s No. 11 La. Long Leaf Lbr. Co., Sec. 10-7-11, 330 ft. N and W, SE cor. NE NW .... W.O.S.R. 2,592 ft.
Ohio Oil Co.'s No. 9 Bowman-Hicks, Sec. 35-8-12, 250 ft. N, 330 ft. E, SW cor. NW SE ..... Drlg. 100 ft.
Sabine Prod. Co.'s No. 3 Pearce, Sec. 10-7-11, 330 ft. S and E, NW cor. SE NW ..... Derrick.

NEW METHODS

NEW EQUIPMENT

There are three major factors at work at this time in the refining industry that assure manufacturers of equipment an active year:

1. Depreciation

With domestic consumption 1.9% higher in 1931 than in 1930, the refineries have operated continuously. The total consumption of all oils last year was 93 per cent of the 1929 peak. Better than 90 per cent of refineries operated 24 hours daily, 365 days of the past year. Efficiency of operation requires frequent replacement which cannot be postponed.

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3. Improved Products

In addition to depreciation and increased capacity, two factors which are always at work, we have an entirely new market for equipment created by the demand for gasoline of higher octane rating. Plant improvements are essential in practically every one of the 375 refineries that hope to meet competition.

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Smith et al's No. 1 Hale, Sec. 1-7-12, 330 ft. S and W, NE cor. NW SE ..... W.O.S.R. 2,535 ft.
Stovall Drlg. Co.'s No. 3 Nulton, 330 ft. N and W, SE cor. SE NE, Sec. 2-7-13 ..... Location.

UNION PARISH

Southern Carbon Co.'s No. 58 fee, Sec. 17-20-4e, 1,557 ft. W, 1,220 ft. S, NE cor. Sec. ..... Rigging up.

ARKANSAS

UNION COUNTY—EL DORADO

Ark. O. & G. Co.'s No. 4 Anderson, Sec. 31-17-15, 2,005 ft. S, 150 ft. W, NE cor. NW SW ..... Completed pumping 35 bbls. 2,-190 ft.
Lion O. & R. Co.'s No. 9-A G. P. Hayes, 242 ft. S, 246 ft. W, NE cor. Lot 5, NE, Sec. 4-16-15 ..... S.D; high wtr. 7,255 ft.
Southern Prod. Co.'s No. 1 Wingfield, NE cor. SE NW, Sec. 16-19-15 ..... S.D. 2,608 ft.

UNION COUNTY—URBANA

Marine Oil Co.'s No. 1 Winn est., 330 ft. S and E, NE cor. S½ NW, Sec. 11-18-13 ..... T.A. 3,586 ft.
Marine Oil Co.'s No. 2-E Thompson, 330 ft. N, 330 ft. E, SW cor. NE NE, Sec. 10-18-13 ..... Location.
Wilson & Chapman's No. 1-B Hadley, Sec. 3-18-13, 330 ft. S and W, NE cor. SE NW ..... T.A. 3,545 ft.

EAST TEXAS

PANOLA COUNTY

Daisy O. & G. Co.'s No. 1 Rucks, John Palmer Sur. .... T.A. 2,194 ft.
Nat. Gas Prod. Co.'s No. 1 Cadenhead, 5,219 ft. N, 5,620 ft. E, SW cor. B. C. Jordan Sur. ..... Set 12½-in. 40 ft.
Nat. Gas Prod. Co.'s No. 3 Mays, 158 ft. S, 442 ft. W, NE cor. 42.5-ac. tr., Jane Thorpe Sur. ..... Completed 360,000 ft. gas 3,360 ft.
United Prod. Co.'s No. 12 Werner, 1,959 ft. W, 556 ft. N, SE cor. 66.6-ac. tr., B. C. Jordan Sur. ..... Derrick abd.
United Prod. Corp.'s No. 17 Steele, 1,320 ft. N, 660 ft. W, SE cor. C. D. Steele lse., in B. C. Jordan Sur. .. Location.

MISSISSIPPI

HINDS COUNTY

James Alexander, tr.'s No. 1 Pullen, Sec. 26-6n-1e, C NW NE ..... Derrick.
Belhaven College's No. 1 fee, Sec. 35-6n-1e, 360 ft. E, 210 ft. S, NW cor. SE NW ..... Rigging up.
Ferguson-Fuller et al's No. 1 Cruse, Sec. 34-6n-1e, 420 ft. E, 170 ft. N, SW cor. NW ..... Drlg. 2,335 ft.
Love Pet. Co.'s No. 1 Interior Lbr. Co., Sec. 2-5n-1e, 90 ft. W, 270 ft. N, SE cor. SW ..... Drlg. 2,015 ft.
McGuire et al's No. 1 Spring Lake, Sec. 11-5n-1e, 250 ft. N, 460 ft. W, from center of Sec. ..... Derrick pattern.

RANKIN COUNTY

Cummins & Montgomery's No. 1 Ivey, Sec. 13-5n-1e, NE Lot 10, Blk. D, E. Jackson Pl., First Addn. .. Derrick.
Meredith et al's No. 1 Strowder, Sec. 12-5n-1e, SE cor. SW NE ..... Set 6⅝-in. 2,370 ft.

WILDCAT OPERATIONS IN MISSISSIPPI

HINDS COUNTY

Company, farm and location—	Remarks:
Atkins et al's No. 1 Crane Lawrence, Sec. 23-6n-1e, 300 ft. E, 132 ft. N, SW cor. NE SE	Derrick.
Miss.-Minn. Oil Co.'s No. 1 Edwards Land Co., Sec. 23-6n-4w, 1,200 ft. N and E from center of Sec.	Set 12½-in. 110 ft; drlg. 460 ft.
Southern Pet. Co.'s No. 1 Wilton (was Tri-State O. & G. Co.'s), 320 ft. E, 240 ft. N, SW cor. SE NE, Sec. 28-6-1e	Arranging to set 4½-in. 2,498 ft.

JASPER COUNTY

Bay Springs Pet. Co.'s No. 1 Keyes, C NW NE, Sec. 2-12-9 ..... T.A. 3,408 ft.

LOWNDES COUNTY

Lowndes County Oil & Dev. Co.'s No. 1 Carr est., Sec. 34-17-16e, 1,320 ft. E, 330 ft. S, NW cor. Sec. ..... Rigging up.

NEWTON COUNTY

Bob Dalton's No. 1 Majure, 400 ft. N, 300 ft. E, SW cor. SE, Sec. 25-6n-11e ..... S.D. 340 ft.

NOXUBEE COUNTY

Thompson & Donohue's No. 1 Donohue, Sec. 25-16n-17e.. S.D. 1,735 ft.

RANKIN COUNTY

Attkisson & Dyer's No. 1 Valentour, 200 ft. S, 200 ft. E, NW cor., Sec. 18-5n-2e ..... Waiting on csg. 2,428 ft.
James Alexander, tr.'s No. 1 Ridgeway-McGehee, Sec. 1-5n-1e, 200 ft. N, 320 ft. W, SE cor. NE SE ..... Set 6⅝-in. 2,319 ft.
Baker et al's No. 1 Rankinside Dev. Co., Sec. 6-5n-2e, 200 ft. N, 200 ft. E, SW cor. NW SW ..... Rigging up.
Henslee et al's No. 1 Tanner, Sec. 14-5n-1e, 400 ft. S, 200 ft. E, NW cor. NE NE ..... Completed 43,700,000 ft. of gas 2,-403 ft.
Majestic O. & G. Co.'s No. 1 Elton Lbr. Co., Sec. 10-4n-3e. Derrick.
Muse & Muse's No. 1 Cotton, Sec. 14-5n-1e, 1,320 ft. S, 200 ft. E, NW cor. NE NW ..... Drlg. plug 2,406 ft.

SCOTT COUNTY

M. U. Culley et al's No. 1 Owens, Sec. 2-3-9 ..... Derrick.

SHARKEY COUNTY

United Gas Public Service Co.'s No. 1 Lenhart, Sec. 14-14n-6w, 660 ft. N of C of S line of Sec. ..... Set 10-in. 976 ft.

WARREN COUNTY

Eagle Bend O. & G. Co.'s No. 1 Kiger, SW cor. SW SE, Sec. 9-18-2 ..... S.D. 2,607 ft.

GULF COAST FIELDS AND WILDCATS

(Continued from Page 39)

The Texas Company's No. 1 Polk-Kuhn-Glass, 260 ft. E and 1,545 ft. S of SW cor. Marshall Beaucham Sur., in the T. J. Notgrass Sur. ..... Sticky shale 6,103 ft.; cmtd. 9⅝-in. csg. 6,083 ft.
The Texas Company's No. 3 Kuhn, 587 ft. S and 150 ft. W of NE cor. of the Mary E. Hall Sur. No. 2 .. Drlg. sand and shale 3,075 ft.

HULL—LIBERTY COUNTY

Eclipse Oil Co.'s No. 1 Barrow, Jesse DeVore Sur., 50 ft. from N line and 31 ft. from E and W lines 37-acre tract ..... Sandy shale showing oil 4,160-4,202 ft.; cmtd. 6⅝-in. csg. 4,152 ft.
Republic Prod. Co.'s No. 145 Dolbear, Jesse DeVore Sur., 200 ft. SE of No. 85 and 200 ft. N of No. 61 ..... Drlg. gumbo 2,360 ft.

PIERCE JUNCTION—HARRIS COUNTY

Anderson & Plummer's No. 4 Whitehead (W.O.) ..... T.D. 4,521 ft.; sidetracking in sandy shale 4,205 ft.
Gulf Prod. Co.'s No. 9 Cain, Jas. Hamilton Sur. No. 95, 150 ft. N of No. 20 Taylor and 290 ft. E of W line of Cain lease ..... Set 12 ft. of 4½-in. screen 4,005 ft.; comp. flowing 500 bbls. oil, 400 lbs. pressure, ¼-in. choke.
Humble Oil & Ref. Co.'s No. 1 Hooks (D.D.), James Hamilton Sur. No. 52, 904 ft. N of SW cor. along W line of lease and 396 ft. E at right angles ..... Cap rock 4,255 ft.; plugged to 4,005 ft.; set screen 3,956 ft.; tested salt water; cutting liner.
Pure Oil Co.-Moody Receiver's No. 3 Herman, Jas. Kopman Sur., 200 ft. due W of C of E line of 25-acre tract ..... Spudded.
Rio Bravo Oil Co.'s No. 21-A Settegast (D.D.), J. Kopman Sur., 400 ft. S and 200 ft. E of NE cor. "A" lease ..... Set 25 ft. 4½-in. screen 4,313 ft.; flowed by heads; rigging up to pump.
Rio Bravo Oil Co.'s No. 23-A Settegast, Jos. Kopman Sur. No. 44, 1,375 ft. S and 200 ft. W of NE cor. "A" lease ..... Set screen 4,161 ft.

RABBS RIDGE—FORT BEND COUNTY

Cullen & West and Gulf Prod. Co.'s No. 3 George, John Rabb Sur., 1,000 ft. due E of No. 2 ..... Drlg. hard shale 4,933 ft.
Cullen & West and Gulf Prod. Co.'s No. 3 Lockwood, John Rabb Sur., 1,000 ft. due E of No. 2 ..... Rig.
Cullen & West and Gulf Prod. Co.'s No. 2-B Lockwood & Sharp, John Rabb Sur., 600 ft. W of No. 1-B ..... Location.
Gulf Prod. Co.'s No. 1 T. R. Booth, Samuel Kennedy Sur., 475 ft. N of S line of Booth 475-acre tract, due N offset No. 1 Booth-Meyers ..... Drlg. gumbo 3,625 ft.

HIGH ISLAND—GALVESTON COUNTY

Yount Lee Oil Co.'s No. 26 Cade, N. Fitzsimmons Sur., 600 ft. S of No. 24 ..... Drlg. shale and lime 3,212 ft.
Yount Lee Oil Co.'s No. 27 Cade, N. Fitzsimmons Sur., 600 ft. N of No. 21 in line with Nos. 22 and 23 ..... Location.
Yount Lee Oil Co.'s No. 1 Broussard & Orme, 300 ft. E of N cor. of N. Fitzsimmons Sur., in Martin Dunman Sur. ..... Drlg. 4,010 ft.

MOSS BLUFF—LIBERTY COUNTY

Humble Oil & Ref. Co.'s No. 9 Sterling, Jas. McFaddin Sur., 300 ft. W of No. 1 ..... Drlg. shale 1,201 ft.

DAMON MOUND—BRAZORIA COUNTY

Intercoastal Oil Co.'s No. 9 Wisdom, S 45 deg. 312 ft. from NE cor. Lot C, Blk. 62, A. Darst Sur., and thence S 45 deg. 325 ft. in Lot A ..... Derrick.
The Texas Company's No. 2 Cave, 165 ft. NE and 55 ft. N, 45 deg. W from S cor. Lot B, Blk. 73, Wisdom Subd., A. Darst Sur. ..... Drlg. shale and lime 3,674 ft.

BLUE RIDGE—FORT BEND COUNTY

Gulf Prod. Co.'s No. 19 Luscher, Thos. Habermacher Sur., 1,650 ft. from N line and 550 ft. from E line of 490-acre tract ..... Drlg. gumbo 1,176 ft.

ORCHARD—FORT BEND COUNTY

Gulf Prod. Co.'s No. 32 Moore, Jas. Frazier Sur., N of No. 20 ..... Spudded.

ESPERSON—LIBERTY COUNTY

Cranfill-Reynolds Co.'s No. 20 Esperson, C. W. Fisher Sur., 471 ft. from W line and 510 ft. N of No. 5 Esperson ..... Rig.
Cranfill-Reynolds Co.'s No. 9 Moore's Bluff, M. Duncan Sur., 500 ft. S of N line of Moore's Bluff tract in line with No. 6 Davis and No. 6 Moore's Bluff ..... Rig.

SARATOGA—HARDIN COUNTY

Rio Bravo Oil Co.'s No. 130-A "B" ..... T.D. 541 ft.; sand 500-40 ft.; comp. flowing 54 bbls.

LOST LAKE—CHAMBERS COUNTY

Pure Oil Co.'s No. 14 Mayes, E. H. R. Wallis Sur., 650 ft. due E of No. 11 in line with No. 9 ..... Sand showing oil 2,819 ft.; cmtd. 6⅝-in. csg. 2,770 ft.

MARKHAM—MATAGORDA COUNTY

L. P. Smith et al's No. 2 Hudson, 850 ft. from E line and 1,050 ft. from S line Blk. 15, Henry Parker Sur. ..... Drlg. gumbo 550 ft.
United North & South Oil Co.'s No. 1 McDonald, I.&G.N. Sur., Blk. 9, Sec. 5, 460 ft. S and 80 ft. E of NW cor. 35-acre tract ..... Set 1 jt. 4½-in. screen 3,581 ft.; flowed by heads; to deepen.

REFUGIO—REFUGIO COUNTY

Houston Oil Co.'s No. 1 Tom Heard (W.O.), Blk. 16, Townsite ..... Cutting and pulling liner 6,462 ft.
Houston Oil Co.'s No. 2 Rose Lambert (W.O.), SE cor. of tract, Townsite ..... Pulling liner to deepen 5,890 ft.
E. M. Jones' No. 1-B Mitchell (D.D.), 250 ft. NW of SE line and 250 ft. SW of Mission River ..... Sand 6,446 ft.; cmtd. csg.
Larco Gas Co.'s No. 4 Strauch heirs, 150 ft. from N line and 150 ft. from W line, Lot 6, Blk. 2 ..... Shut down 3,696 ft.
Moody-Seagraves Prod. Co.'s No. 2 O'Connor (W.O.), 150 ft. from N line and 508 ft. from W line 62-acre tract ..... T.D. 6,454 ft.; to plug back.
Pearson Properties No. 2 Ryals (W.O.), 600 ft. from S line and 150 ft. from W line of lease ..... T.D. 5,718 ft.; to deepen.

SOUTH LOUISIANA FIELDS

IOWA—CALCASIEU AND JEFF DAVIS PARISHES

Shell Petroleum Corp.'s No. 2 Heyd, 225 ft. out of NE cor. of Sec. 13-9s-7w ..... Drlg. 9⅝-in. csg. cement 5,129 ft.
Shell Petroleum Corp.'s No. 1 Fontenot, Sec. 7-9s-6w, 450 ft. due E No. 2 Heyd ..... Sticky shale and lime 5,135 ft.; cmtd. 9⅝-in. csg. 5,083 ft.

JENNINGS—ACADIA PARISH

Kathleen Oil Co.'s No. 1 Syndicate fee (W.O.), Sec. 46-9s-2w ..... Set screen 4,025 ft.
Reliable Oil Co.'s No. 2 Rawson (D.D.) ..... Rig up to deepen 1,896 ft.
Yount Lee Oil Co.'s No. 10 Housierre-Latrielle, 5,435 ft. E and 1,070 ft. N of SW cor., Sec. 47-9s-2w ..... Set 1 jt. screen 3,678 ft.; fluid standing 500 ft. in hole; bailing.

HACKBERRY—CAMERON PARISH

Calcasieu Oil Co.'s No. 23 Watkins (W.O.), 2,495 ft. W. and 132 ft. N of SE cor., Sec. 13-12s-10w ..... T.D. 2,844 ft.; set whipstock 2,5[illegible] ft.; shut down.
Calcasieu Oil Co.'s No. 1 Unsurveyed Island, 1,035 ft. S and 442 ft. E of NW cor. Sec. 24-12s-10w ..... Derrick.
The Texas Company's No. 9 State, 2,229 ft. N and 918 ft. E of SE cor. of Sec. 13-12s-10w in Twp. 11s-9w.. Building derrick.
The Texas Company's No. 10 State, 2,375 ft. N and 564 ft. E of SE cor. Sec. 13-12s-10w in Twp. 12s-9w ..... Location.
Union Sulphur Co.'s No. 1 Gulf land (Humble lease), 284 ft. N, 30 ft. W of SE cor., Sec. 11-12s-10w ..... Drlg. 5,725 ft.
Union Sulphur Co.'s No. 1 Gulf land (Pure Oil Co. lease), 1,420 ft. N, 400 ft. W of SE cor., Sec. 11-12s-10w ..... Drlg. 4,700 ft.

LOCKPORT—CALCASIEU PARISH

Union Sulphur Co.'s No. 2 Martha Moss (W.O.), 120 ft. S and 56 ft. W of NE cor. SE NW of Sec. 8-10s-9w.. Sand showing oil 6,564-72 ft.; to set screen.

VINTON—CALCASIEU PARISH

Gulf Ref. Co.'s No. 1 Gray (D.D.), 125 ft. W and 85 ft. N of SE cor. NE SE of Sec. 33-10s-12w ..... Drlg. gumbo 2,733 ft.
Marrs McLean's No. 13 Gray, 464 ft. E and 460 ft. S of C of Sec. 30-10s-12w ..... Rig.
Vinton Petroleum Co.'s No. 1 Matilda Gray (20 acres), 48 ft. N and 89 ft. W of SE cor. SW NE of Sec. 33-10s-12w (D.D.) ..... Rigging up to deepen 3,214 ft.

SULPHUR—CALCASIEU PARISH

Union Sulphur Co.'s No. 732 fee (W.O.), 965 ft. N and 2,065 ft. W of cen. of Sec. 29-9s-10w ..... Pulling screen to deepen 3,252 ft.
Union Sulphur Co.'s No. 765 fee, 375 ft. N and 188 ft. W of SE cor. SW NW of Sec. 29-9s-10w ..... Drlg. 2,726 ft.
Union Sulphur Co.'s No. 769 fee, 295 ft. S, 918 ft. W of C of Sec. 29-9s-10w ..... Drlg. 2,610 ft.

PORT BARRE—ST. LANDRY PARISH

W. A. Aggers' No. 1 Cochran, 250 ft. S and 250 ft. E of NW cor. of Fractional Sec. 21-6s-5e ..... Spudded.
Port Barre Oil Co.'s No. 1 Sibille, Sec. 20-6s-5e, 600 ft. S and 124 ft. E of NW cor. 20-acre tract ..... Drlg. gumbo 2,874 ft.
The Texas Company's No. 11 Botney Bay, west offset Gulf Ref. Co.'s No. 1 Wilson & Cochran ..... Location.

MISCELLANEOUS WILDCATS

TEXAS

AUSTIN COUNTY

United Oil Syndicate's No. 2 Levitt, John Peake Sur., 75 ft. NW of No. 1 ..... Location.

C. O. Farrington et al's No. 1 Jackson, Brookshire, S. F. Austin Sur. No. 10, 750 ft. NW of Empire Gas & Fuel Co.'s No. 1 Jackson and 250 ft. S of NW line ... Spudded.
Grant & Baker's No. 1 Chesley, W. C. White Sur., 150 ft. from NW line and 150 ft. from SW line of 26-acre tract (northeast of Raccoon Bend Field) ..... Rigging up.
O'Hara Oil & Gas Co.'s No. 1 Nelloua, J. C. Cummings Hacienda Sur., 650 ft. N of No. 1 Schroeder in 18-acre tract, north edge Mill Creek ..... Derrick.
Pomacal & Boletka's No. 1 Schebajsa, 329 ft. N, 78 deg. E of N cor. B. Dottery Sur., near center of SW line of S. F. Austin 4 League on west fork of Mill Creek.. No report.
Vogelpohl et al's No. 1 Trenchman, J. Cummings Hacienda Sur., 319½ ft. from E line, 1,244 ft. from S line of 32¼-ac. tract ..... Location.

BRAZORIA COUNTY

W. D. Southerland's No. 1 C. W. Chapman, 294 ft. from S line and 104 ft. from E line of Lot 2, Andrew Robinson Sur. ..... Standing 1,514 ft.
The Texas Company's No. 2 Belcher, Harvey N. Little Sur., 1,728 ft. southeasterly from N cor. of S half of Sur., along NE line and thence 123 ft. at right angles ..... Set 56 ft. of 7-in. screen 5,602 ft. with 75 ft. of 11ank; comp. flowing 43 bbls. net oil, 65 per cent b.s., in first 12 hrs., ¼-in. choke; est. 5,000,000 ft. of gas; 1,760 lbs. on tubing and 1,600 lbs. on casing; gravity oil 39.2 deg.; temp. 104°.

BURLESON COUNTY

Marek & Son's No. 3 A. Marek, N. McFaddin Sur., 1,068 ft. N and 226 ft. W of SE cor. of tract..... Standing 2,210 ft.
M. O. & T. Corp.'s No. 1 Rigers ..... Shut down 2,050 ft.

FORT BEND COUNTY

O'Hara et al's No. 1 Brown, Pilant Lake, Wm. Barrett and Abner Harris Sur., 600 ft. out of SW cor. of Brown 600-acre tract ..... Shut down 1,027 ft.
Naylor & DeCosta's No. 1 Naylor, 6,350 ft. N 55 deg. E from SW cor. 653-acre tract in Christman Sur. ..... Cmtd. 20-in. csg. 140 ft.

GRIMES COUNTY

Barnett et al's No. 1 Dodd, Timothy Jones Sur., 280 ft. N Cobb & Rasmussen's No. 1 Dodd ..... No report.
Blanjo Oil Co.'s No. 3 Cuthrell, Patrick B. O'Connor Sur., 150 ft. S, 10 degrees E of No. 2 ..... Shut down 1,150 ft.
Stanolind Oil & Gas Co.'s No. 1 Mary Sullivan, A. Yeamens Sur., 998 ft. out of SE cor. of 712-acre tract.... Rig.

HARRIS COUNTY

Shubert & Alexander's No. 1 Herman Hale, 1,058 varas E of NW cor. R. A. Hanks Sur., thence 790 varas S and thence 70 varas W 74 deg. ..... Shut down 2,720 ft.

JACKSON COUNTY

Chicago Gulf Corp.'s No. 4 Druschell (W.O.) ..... No report.
Chicago Gulf Corp.'s No. 10 Druschell, Hayes Sur., 1,300 ft. NW of No. 3 ..... No report.

JASPER COUNTY

Hext Drlg. Co.'s No. 1 Flourney, B. F. Jones Sur., 900 ft. NW of Helmerich & Payne's No. 1 Flourney..... Reported sand showing oil 3,997 ft.; setting 6⅝-in csg. 2,200 ft.

JEFFERSON COUNTY

Brown et al's No. 1 M. O. Todd, 200 varas S and 58 varas E of NW cor. of Wm. Carr Sur. ..... Gumbo 850 ft.; shut down.
John I. Pipkin and Elam's No. 1 Broussard, McGaffey Sur., 800 ft. from S line in center E and W of 205-acre tract ..... Water sand 2,100 ft.; shut down.
C. R. Tolliver et al's No. 1 Tolliver, Duches Sur., 3,500 ft. from W line and 1,500 ft. S of Pine Island Bayou.. No report.
Westbury Oil Co.'s No. 4 West, 450 ft. W and 4,210 ft. S of NE cor. of T. D. Yoakum Sur. ..... Shut down in gumbo 600 ft.

LIBERTY COUNTY

Hamm et al's No. 1 Harvard, Davis Hill ..... Gumbo 1,015 ft.; shut down.
J. T. May et al's No. 1 Dunman, J. C. Martin League... Location.

MATAGORDA COUNTY

Dr. Griffith et al's No. 3 Baer, Big Hill, 5,000 ft. N, 3,000 ft. E from SW cor. of Seth Ingram Sur..... Drlg. 235 ft.
United North & South Oil Co.'s No. 1 Stoddard, J. C. Keller Sur., 150 ft. W and 545 ft. N of SE cor. Blk. 53, Buckeye Townsite ..... Cored sand with slight show of oil 7,843-53 ft.

MONTGOMERY COUNTY

Herman Heep et al's No. 1 Cartwright, 2,851.6 ft. southerly along W line from NW cor. of John O. Davis Sur. and thence 450 ft. E from said line..... Drlg. shale 3,787 ft.
Pevehouse Oil Co.'s No. 1 Sealey, Jas. Pevehouse Sur., 1,575 ft. N of N line of Horton & Woodson's 1,562-acre tract and 3,226 ft. E of W line of H.&W. 1,870-acre tract ..... Drlg. sticky shale 3,760 ft.

NEWTON COUNTY

R. T. Briscoe et al's No. 1-A Joe Inman, 1,950 ft. E and 500 ft. N of SW cor. J. M. Scott Sur. ..... Shut down 1,795 ft.

ORANGE COUNTY

Altex Oil Co.'s (Veteran Oil Co.) No. 1 Reed, A. Nelson Sur. No. 1, 500 ft. from N line and 250 ft. from E line of tract ..... T.D. 4,063 ft.; sidetracking hard sand 3,672 ft.
Crew Oil Co.'s No. 1-A Mansfield, 50 ft. E of No. 1..... Shut down 2,275 ft.

POLK COUNTY

Freeman et al's No. 2 Freeman ..... Shut down 3,162 ft.
T. B. Hoffer's No. 1 Saner-Ragly Lbr. Co., 300 ft. out of most northerly cor. of most easterly County School Land Abst. 271 ..... Shut down 1,517 ft.

REFUGIO COUNTY

Blanco Creek Oil Co.'s No. 1 Damaan, 150 ft. from N line and 150 ft. from W line of Blk. 14, Bonnie View Ranch Subd. ..... Shut down 4,627 ft.
J. C. Dixon's No. 1 Peck, 450 ft. S, 150 ft. E of NW cor. of S half of Sec. 24, Bonnie View Ranch Subd., Estaban Lopez Sur. ..... Sandy shale 2,292 ft.; reaming to set casing.
Humble Oil & Ref. Co.'s No. 2 O'Connor, John Keating Sur., 12,625 ft. N of S line at right angles and 3,158 ft. W of E line at right angles ..... Drlg. brown shale 2,145 ft.

SAN JACINTO COUNTY

R. P. Edwards' No. 1 J. R. Bennett, Cold Springs ... Shut down 750 ft.

TRINITY COUNTY

John Deering's No. 1 J. B. Gibson ..... Drlg. 2,075 ft.
Mound Prairie Oil Co.'s No. 1 Cameron ..... Abnd. 4,502 ft.
Scientific Producers Co.'s No. 1 Thompson, L&G.N. Sur. No. 47, 50 ft. out of NE cor. of H. K. Thompson 199-acre tract ..... Shut down 1,191 ft.

TYLER COUNTY

King Oil Co.'s No. 1 Caswell ..... Sand and shale showing oil 1,258 ft.; cem. 6-in. casing 1,218 ft.; standing.
Allied Pet. Co.'s (Texas Southern Pet. Co.) No. 3 Wilson, Mrs. E. Cherry Sur. No. 795, 1,500 varas from W line and 600 varas from N line ..... Shut down 5,025 ft.

VICTORIA COUNTY

Bunte et al's No. 2 Keeran, Martin DeLeon Sur., 200 ft. E of No. 1 ..... Location.
Houston Oil Co.'s No. 1-A McFaddin, 200 ft. from NE line, 240 ft. from SE line of I.R.R. Sur. No. 20..... Location.
T. B. Slick Estate's No. 2 McFaddin, J. Varian Sur., 3,500 ft. NW of No. 1 and 1,100 ft. NE at right angles to SW line of lease ..... Rig.
The Texas Company's No. 4 McFaddin, 86 deg. E, 1,728½ ft. from NE cor. of Andrew J. Gray Sur. in John M. Rine Sur. ..... Drlg water sand 645 ft.

WALKER COUNTY

Hart Oil Co.'s No. 1 Thompson Lbr. Co., Jose Ortega Sur., 1,265 ft. S, 1,876 ft. W of SW cor. of J. B. Gibson's 71-acre tract ..... Shut down for repairs 2,090 ft.

WALLER COUNTY

McDaniel and associates' No. 1 Citizens State Bank, B.B.B.&C. Sur., C of 150-acre tract ..... No report.

SOUTH LOUISIANA

ASCENSION PARISH

McElroy Pet. Co.'s No. 2 Lacey, 150 ft. S, 150 ft. W of NE cor. of Sec. 29-10s-4e ..... Shut down 4,515 ft.

CALCASIEU PARISH

Crawford Doyle's No. 1 Johnson, Sec. 23-9s-13w..... Shut down 875 ft.
L. O. Davis' No. 1 Industrial, Sec. 29-9s-10w..... Standing 6,568 ft.
Hill Oil Co.'s No. 1 W. S. Vincent et al, 642 ft. W, 75 ft. N from SE cor., Sec. 25-10s-10w..... Shut down 3,255 ft.
Wilfred Lahay's No. 1 Jardell, Sec. 16-10s-12w..... Shut down 3,650 ft.
Success Oil Co.'s No. 1 Hewitt, 90 ft. out of SW cor., Sec. 11-9s-11w ..... Rig.

CAMERON PARISH

Brownie-Babbette Oil Co.'s No. 1 R. A. Moore, 562 ft. W, 50 ft. S of NE cor. E half SE of Sec. 18-12s-12w.. Drlg. 320 ft.

EVANGELINE PARISH

Emile LeDeau's No. 1 Vidrine, 260 ft. W and 350 ft. S of NE cor. of Sec. 47-3s-2e ..... Rig.

IBERIA PARISH

Jefferson Lake Oil Co.'s No. 28 Lake Peigneur, Sec. 58-12s-5e, 150 ft. W NW of No. 26 and 1,720 ft. SW No. 25 ..... Comp. sulphur test.
Jefferson Lake Oil Co.'s No. 29 Lake Peigneur, Sec. 58-12s-5e; 150 ft. W NW of No. 28 in direct line with Nos. 26 and 28 ..... Sulphur test.
Warrick Oil Co.'s No. 1 Bernard, 912 ft. N and 150 ft. E of SW cor. Sec. 54-12s-7e ..... Rig.

IBERVILLE PARISH

Standard Oil Co.'s No. 2 Myrtle Grove-Wilbert, Bayou Choctaw, 2,040 ft. N and 600 ft. W of C of Sec. 52-9s-11e ..... Drlg. 2,486 ft.
Standard Oil Co.'s No. 3 Gay, Bayou Choctaw, 4,500 ft. N and 600 ft. E of SW cor. SE of Sec. 52-9s-11e..... Drlg. 4,925 ft.
Standard Oil Co.'s No. 7 Schwing, Bayou Blue, 1,359 ft. N and 1,856 ft. E of C of Sec. 74-9s-10w..... Drlg. 4,094 ft.

LA FOURCHE PARISH

Pop Oil Co.'s No. 1 Esponge Vizier, Sec. 26-21s-22e, 75 ft. N, 289 ft. E of The Texas Company No. 4 L.L.&E. ..... Oil sand 3,711-19 ft.; cmtd. 6⅝-in. csg. 3,710 ft.
State Prod. Co.'s No. "D" W. H. Stark, 1,935 ft. S and 1,550 ft. W of NE cor. Sec. 72-15s-15e ..... Sulphur test.
The Texas Company's No. 4 L.L.&E., Leesville, Sec. 26-21s-22e ..... Drlg. sandy shale 3,225 ft.

POINTE COUPEE PARISH

Grand Bay Oil & Gas Co.'s No. 1 Moniotte, 10,140 ft. S and 13,450 ft. E of NW cor. Twp. 5s-11 in Sec. 34.... Shut down 310 ft.

TERREBONNE PARISH

Freeport Sulphur Co.'s No. 1 Wurzlow, 1,200 ft. N and 2,600 ft. W of SE cor. Sec. 8-22s-18e ..... Rig.
La. Gas & Fuel Co.'s No. 2 Minor, 3,480 ft. S and 1,980 ft. E of NW cor., Sec. 3-18s-16e ..... Drlg. 5,120 ft.
The Texas Company's No. 5 State, Dog Lake, 2,270 ft. S and 450 ft. E of NW cor. of Sec. 5-22s-16e..... Rig.
The Texas Company's No. 4 La.L.&E., Bay Junop..... Location.
The Texas Company's No. 5 State, Lake Pelto, 1,505 ft. N and 1,539 ft. W of SE cor. of Sec. 8-23s-18e..... Drlg. hard lime rock 3,132 ft.
The Texas Company's No. 10 State, Lake Barre..... Location.
The Texas Company's No. 12 State, Lake Barre..... Drlg. sticky shale 2,376 ft.
The Texas Company's No. 14 State, Lake Barre..... Location.

VERMILLION PARISH

Pure Oil Co.'s No. 2 Alliance Trust Co. Gueydan, 1,875 ft. E and 950 ft. S of NW cor. of Sec. 34-11-1w.. Coring sand 3,252 ft.

WEST FELICIANA PARISH

Putnam Syndicate's No. 3 Como Plantation, Sec. 51-1s-4w. Shut down 2,449 ft.

WILDCAT OPERATIONS IN OKLAHOMA

(Continued from Page 34)

LATIMER COUNTY

P. English's No. 1 Unknown, NW SE Sec. 16-6-19 ..... S.D. 1,542 ft.

LINCOLN COUNTY

Hilton Phillips' No. 1 Phillips, SW NW, Sec. 2-14-3..... Drlg. 3,150 ft.
Mote et al's No. 1 School Land, NW cor. Sec. 36-17-5.... Drlg. 1,325 ft.

OKLAHOMA COUNTY

Citizens Oil Co.'s No. 1 Sage Barber, NE cor. Sec. 21-11-3w ..... S.D. 1,200 ft.
L. C. Hivick's No. 1 Sunset Addition, NW SW NW Sec. 17-11-3w ..... S.D. 5,515 ft.

PAWNEE COUNTY

Rookstool's No. 1 Wylie, NW NE SW Sec. 6-20-5 ..... S.D. 1,950 ft.

PITTSBURG COUNTY

Ruby Ann Oil Co.'s No. 1 George, CEL NW SE, Sec. 3-4-16 ..... Drlg. 200 ft.
Tape Oil Co.'s No. 1 Fulton, SE Sec. 34-7-14 ..... S.D. 1,700 ft.
J. Morrison's No. 1 Fowler, NE SE Sec. 13-7-17 ..... Rig.
C. Kennedy's No. 1 Travis, C SW NE Sec. 14-7-14 ..... Rig.
C. Canady's No. 1 Jones, NW cor. Sec. 14-8-14 ..... Rig.

ROGER MILLS COUNTY

Ute Oil Co.'s No. 1 Williams, C SW Sec. 23-12-24w..... C.O. 5,150 ft.
L. C. Hivick's No. 1 Davis, C NW NE Sec. 4-11-26w..... S.D. 3,420 ft.

WASHITA COUNTY

Miley Pet. Co.'s No. 1 Wolfe, NE SW Sec. 23-9-17w..... Rig.
Cooper & Terhune's No. 1 Blocker, NW cor. Sec. 29-8-19w ..... Drlg. 2,740 ft.; show oil 2,459-67 ft.; S.D. 2,757 ft.
Burns & Prince's No. 1 Deck, SW cor. Sec. 21-8-18 ..... S.D. 1,265 ft.

OKLAHOMA PANHANDLE

TEXAS COUNTY

Three Way Oil Co.'s No. 1 Crane, SW NW Sec. 11-1-1B... T.D. 4,720 ft.; to cement.

SOUTHERN OKLAHOMA

ATOKA COUNTY

Brookshire's No. 1 R. W. Rowland, NW NE SE Sec. 18-3s-10 ..... S.D. 1,720 ft.

BRYAN COUNTY

Bryan County Oil's No. 1 Childs, NW SE SW Sec. 7-7-10.. T.D. 650 ft.
Bush et al's No. 1 Commerce Trust, NE cor. Sec. 35-6s-9 ..... T.D. 740 ft.; plugged back to 459-80 ft.
Whalem et al's No. 1 Mason, NW SE SW Sec. 24-6s-9..... Abd. 935 ft.

CARTER COUNTY

Lundy's No. 1 Spraggins, C NE NW SW Sec. 8-1s-2w .... S.D. 2,495 ft.

JEFFERSON COUNTY

Smith's No. 1 McCarty, SE NW NE Sec. 18-4s-8w ..... Location.

MARSHALL COUNTY

Starrett et al's No. 1 Henry, NE NW Sec. 22-7s-6 ..... Rig.
F. H. E. Oil Co.'s No. 1 Beard, NW SE Sec. 3-8s-6..... T.D. 931 ft; abd.
Everett et al's No. 1 Agres, SE NE Sec. 14-7s-6 ..... S.D. 1,170 ft.
Newman et al's No. 1 Henry, NW cor. Sec. 22-7s-6..... Rig.

McCURTAIN COUNTY

Prassell et al's No. 1 Wagoner, SE NE Sec. 5-8s-27..... S.D. 250 ft.
Stampfs et al's No. 1 Harris, SW NW SW Sec. 14-9s-25.. S.D. 2,731 ft.
Stewart's No. 1 Patterson, C SE SE Sec. 7-6s-24 ..... S.D. 1,308 ft.

PUSHMATAHA COUNTY

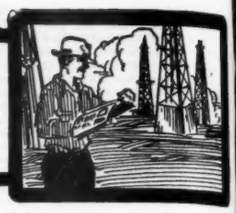
Whitehead et al's No. 1 Messer, SE SW SW Sec. 25-3s-18 ..... S.D. 840 ft.

STEPHENS COUNTY

Brown's No. 1 Hightower, SW SE NE Sec. 15-3s-5w..... Sand 990-1,004 ft; S.O; S.D.
George's No. 1 Ryan, NW SW NE Sec. 31-2-15..... S.D. 510 ft.

CLASSIFIED WANTS

Read by Oil Men Everywhere



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THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

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FOR SALE—New Braden Type B-15 heavy duty winch. Suitable for use with truck or tractor as rod and tubing machine. Address Box E-930, The Oil and Gas Journal, Tulsa, Okla.

200 AMP. General Electric Arc Welder; portable; 220 V. 3 ph. 60 cy. Complete. Like new. $350. 7x6 Ingersoll-Rand Type ER-1 Air Compressor. Like new. $225. 8x6 Ingersoll-Rand Type ER-1 Air Compressor. Like new. $250. 36"x18' Fifield Screw Cutting Lathe. $650. Also large stock of lathes, shapers, pipe machines, bolt threaders, etc. Send for our list. Terms to suit.
CINCINNATI MACHINERY & SUPPLY CO.
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YOUNG MAN with 10 years' experience in sales promotion work (domestic and foreign) is seeking new connection with company manufacturing oil field equipment or specialty. Now employed by largest manufacturer in business, services available April. Best references. Address Box E-994, The Oil and Gas Journal, Tulsa, Okla.

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By tech. grad., age 35, married. Exp. research chem., development eng., lubricating eng., process investigator, chief chem., refnry. supt., technical publicist, executive. Or, given financial support by mfgr. or individual, will show how past exp. and patents will make you money. Address Box F-102, The Oil and Gas Journal, Tulsa, Okla.

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WANTED—Salesmen, High class proposition big proven area East Texas. Monthly dividends paid from producing properties. Penn Oil Corporation, 706-12 Herskowitz Bldg., Oklahoma City, Okla.

WANTED—Men with cars to sell Pumping Jacks, etc., on commission. Man each for Ark., La., Ky., Mont., Wyo., Cal., Mich., Okla., Kans., Mexico, N. Mex., three in Tex. References. Box 88, Tulsa.

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ROYALTIES PRODUCTION

8,000 ACRES in solid block in S.E. Texas. Will turn on drilling contract or as commercial lease. W. R. Miller, 1216 Hurley Ave., Fort Worth, Texas.

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WILL SELL to the highest cash bid this valuable landowner's Royalty. ⅛ of ⅛ of the landowner's full royalty 160 acres, Northeast ¼, Section 12, Block A-46, public school land, Andrews County, Texas. Production three sides. Box 513, Hernover, N. H.

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ROYALTIES in the territory of coming big development in Kansas, Stafford, Barton, Ellsworth, Kingman and Stevens Counties, core drilled. Also producing royalties. Special service to brokers. Send for list. James R. Haynes, Grantville, Kans.

TO DEALERS

I have an East Texas Royalty actually paying 43% on investment. John L. Dickson, Box 1037, Tulsa, Okla.

EASTERN FIELDS

(Continued from Page 45)

this test. In Proctor, Church and Clay districts, no further progress has been made at the rigs standing for tests on the Stewart, Hubbard and Parson farms.

In Boone County, the Cambridge Gas Co. is spudding in for a second test on the C. C. Lewis heirs' farm in Scott district. In Washington district, C. P. Jones has reached 1,533 feet in a second test on the J. Albert Covert farm, and on the same farm, the Hill Gas Co. has shut down for repairs in its second test after reaching 793 feet. In Sherman district, the Pure Oil Co. is shut down at 2,249 feet in No. 56 on the Federal Coal Co. lease and is testing the gas in that formation. In other districts of this county there are numerous rigs standing ready with the tools but drilling has not yet commenced. In Scott district, the Owens-Illinois Glass Co. is ready with the rig and tools for No. 21 on the Cassingham and others' lease, and for No. 2 on the S. M. Wheeler farm, as also for No. 13 on the Little Coal Land Co.'s lease in Washington district. In Sherman district, the same company is ready with the tools for No. 21 on the Peytonia Coal Land Co. tract. The Pure Oil Co. has a rig standing for No. 256 on the Williams Coal Co. tract but as this is an oil territory it is doubtful if it will be drilled at the present time.

In Monongalia County, the West Penn Gas Corp. is cleaning out its test on the Wood Kimble farm in Battelle district preparatory to testing the sand. In Gilmer County, A. E. Ellis and others are rigging up to drill on the Alice M. Ayers farm in DeKalb district. In Roane County, the deep test of the United Fuel Gas Co. remains shut down at 9,100 feet on the J. W. Hinzman farm, Curtis district. A new cable is being made ready to continue the fishing job for the tools which are stuck in the hole.

SOUTHWEST PENNSYLVANIA

Reports from several wells that have been shut down and standing in various townships in Washington County prove disappointing. In Chartiers Township, a local company drilled a test on the A. Woodruff farm to 2,580 feet, the Fifth sand which was dry. In Mount Pleasant Township, Henry Seik farm, the Hickory Penn Gas Co. drilled through the 30-foot sand, a depth of 1,365 feet, and the hole was dry and is being abandoned.

In Smith Township, Washington County, William Dallmeyer found the Gordon sand dry on the Thomas Brown farm and to a depth of 1,672 feet. In the same township, the Hopewell Oil & Gas Co. drilled to 1,630 feet on the Albert Noble farm which proved the Gordon sand also dry at that point. In East Finley Township, the Union Gasoline & Oil Co. went down 2,931 feet on the J. B. Smith farm and found the Fifth sand dry and no profitable formation on the log.

In Beaver County, Andrews Brothers deepened their test on the J. P. Ramsey farm in Hanover Township to 1,465 feet, the Gordon sand. It was a dry hole.

In Washington County, the Carnegie Natural Gas Co. has reached 1,800 feet on the Lizzie Plants farm in East Finley Township. In the same township, this company has a rig standing on the A. Chambers farm. Near Wexford, in Allegheny County, Leidecker and Gosser have reached 1,100 feet in a second test on the P. Shenot farm.

CENTRAL WEST FIELDS

(Continued from Page 45)

Gants farm, SE, Section 28, Troy Township, Fountain County, made an oil showing in the Trenton lime at 1,700 feet, but may not prove a commercial well until entirely completed.

The test of the French Development Corp.'s test on the T. A. Reitzel farm, Section 8, Liberty Township, Hendricks County, does not show anything in the way of production. This well topped the Trenton lime at 2,000 feet and at the last report had gone to 3,200 feet and into the St. Peter sandstone formation, and will no doubt prove a rank duster. This county is directly west of Indianapolis.

The American Industrial Gas Corp. drilled a dry hole on the Hike Kunz farm, NW, Section 17, Brookville Township, Franklin County, almost directly west of Hamilton, Ohio, and not far from the Ohio-Indiana state line. This well drilled through the Trenton lime and 10 feet into the St. Peter sandstone. Same company is drilling on the John Beneker, SW, Section 27, Highland Township, same county. Same company struck a dry hole on the Herman Siebert farm, NE, Section 10, Laughery Township, Ripley County, which lies directly south of Franklin County, and was drilled through the Trenton lime formation.

Knightstown Natural Gas Co. is drilling a second test on the Ramsey farm, north of Charlottsville, in the southeastern part of Hancock County, and east of Indianapolis.

James McMahan and others are reported shut down on the Nellie Graham farm, in Jackson Township, Hamilton County, 5 miles north of Cicero.

ILLINOIS

The only completion reported from Illinois was the Bond County Gas Co.'s test, 400 feet from the south line and 1,300 feet from the west line of the J. C. Henry farm, NE SW, Section 20, Legrand Township, Bond County, which is a fair gas producer from 934 feet.

Eleven wells that have been under way for some time are still shut down, in nine counties in advance of the oil producing fields, along with four wells idle in Clark, Coles and Edgar Counties, while in Crawford County, Price and Weger are drilling No. 1 H. Standfield farm, Section 36, Prairie Township, and a location has been made by Jones and others on the C. A. Taylor farm, Section 2, Honey Creek Township, same county.

KENTUCKY

The bringing in of a 50-bbl. initial producer by Wilcox Brothers on the Wint Cook farm, in the southern part of Cumberland County, brings into line another interesting development for the county, the oil being found at a shallow depth of 450 feet, making that part of the county of much interest. With an advance in the price of crude the shallow drilling should make that part of Cumberland County an active spot during the spring season. This field, which had its discovery well drilled in 1929, is today in line for rapid extension. The producing sands are many, the best known being: First and Second Sunnybrook, Trenton and Knox Dolomite, all of Ordovician age. The Corniferous, Niagara and Clinton sands are absent in this field though the Devonian (Black) shale overlying them is found at the proper horizon.

Cumberland County has two major structural features, the Cincinnati arch and the Meshack uplift. The Cincinnati arch crosses the county with a northeast and southwest trend passing through Meredith Creek and Turkey Neck Bend in Monroe County and Judio, Water View and Renox in Cumberland County. The Meshack uplift (recently discovered by the Kentucky Geological Survey) has an east-west trend running from Tompkinsville, through Little Sulphur Creek, Meshack P. O. Judio, Hood Branch and Judio Bow Hollow near its head. In general the structures are domes though many plunging anticlines are evident.

A history of the oil development shows that in every drilling campaign the areas adjacent to the old pools received first consideration. In view of this knowledge it seems that the areas which will receive the first attention are those in the vicinity of old production.

Owensboro Field

In the Owensboro Field of Daviess County, the Cumberland Petroleum Co., and the Kemrow Co.'s test, 143 feet from the north line and 820 feet from the east line of the W. E. Ivie farm, in the Jones Pool, is reported with an initial production of 40 bbls. from the Stray sand at a depth of 615 feet. S. H. Russell's No. 2 H. O. Neel 75 acres, near Walnut Grove School, same county, is reported at 30 bbls. initially, while Wade & Moore's test on the Burton farm, is said to be good for 25 bbls. in the Jett sand. J. C. Miller and others are drilling No. 1 Charles Bell farm, which is an offset to the Ivie farm well.

In Ohio County the Cumberland Petroleum Co. found a dry hole on the Otto Farmer farm, near Adaburg. The well is in the northwest corner of the farm.

In Daviess County the production of oil for January handled by the Ohio Oil Co. totaled 26,399 bbls., valued at $23,759.39, and the Producers Pipe Line Co. handled 15,888 bbls., with a valuation of $14,299.63, making a total of 42,287 bbls., with a valuation of $38,059.02.

Total runs made from wells served by the Illinois Pipe Line Co. in western Kentucky during February were 104,015.01 bbls.

CALIFORNIA TO STUDY OIL TAXATION METHOD

SACRAMENTO, Calif., Mar. 14.—The State Tax Research Bureau will appoint a petroleum engineer to make a study of methods being used in taxing the oil industry, Finance Director Vandegrift has announced. Two men are under consideration for the post, Frank E. O'Neil of Walnut Park, Los Angeles County, and Edward S. Clute of Los Angeles, now doing petroleum engineering work for the federal government.

Mr. Vandegrift said the expert will survey different methods now used in counties to tax oil lands, production plants and other properties of oil companies. The bureau is to determine the ratio of taxation for the industry and make recommendations for possible changes.

COLON OIL CORP.

Production of Colon Oil Corp.'s subsidiary in Venezuela for the week ended March 5 was 116,064 bbls.

Classified Wants

ROYALTIES—PRODUCTION

For INCOME AND SPECULATIVE Oil Royalties for Investment, write SPENCER ROYALTIES CO. Thompson Bldg., Tulsa, Okla.

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LEASES—PRODUCTION

1,800 OKLAHOMA County royalty buyers' names and addresses compiled from court house records. Price $5.00. Clyde Kelly, 608 Perrine Bldg., Oklahoma City, Okla.

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LEASES—PRODUCTION

HOT EAST TEXAS Woodbine Wildcat just starting 50 to 1 bet few weeks. E. Croft, Proctor, Texas.

FOR SALE — Halby ranch lease 40 acres, mineral rights included. Section 12, Block B-12, Northeast quarter Winkler County, Texas. Rent 15 cents acre. 3 years to run. John Loferski, 2253 S. Sacramento Ave., Chicago, Ill.

VALUES ARE DEFLATED

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411 S. Elwood Ave. Tulsa, Okla.

TEXAS PANHANDLE Gas Production and Royalties is my Hobby—get my prices. Wire or write. E. B. Reeves Box 13, Alanreed, Gray County, Texas.

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These 48 ads occupied 119 lines of space at a total cost of $29.75. Is it possible to interest 164 prospective buyers for less money?

Mail your ad now for the Refinery number, March 31.

CLASSIFIED DEPARTMENT

The Oil and Gas Journal

TULSA, OKLA.

Optimism in Chicago Oil Circles

Small But Steady Daily Increases in Tank Car Prices. Crude Production Situation Regarded as Favorable

By Robert C. Conine
Chicago Bureau, The Oil and Gas Journal, 6 North Michigan Ave.

CHICAGO, Mar. 14.—Business is looking up in Chicago district oil trade circles, and if there are some who feel that gasoline tank car prices are being advanced too rapidly, there are more, including the major refiners and marketers, who are confident that 4 cents will mark the low of the low octane U. S. Motor grade before many days are passed. There is no question about the sharpness of the upward break from a 3-cent low to 3½ cents in almost daily increments of an eighth of a cent, nor can current consumer demand figure in the betterment, as it did in the transient peaks of last season, which were promptly beaten down by sellers hastening to grasp opportunity by the neck. And these facts are taken to indicate among other things two important discoveries or rediscoveries: It is possible for refiners to adjust themselves to conditions and begin showing profits, and the marketers are not reluctant in the matter of tying up the additional capital required in a strong market. Lower crude oil runs to stills and arrest of the rising gasoline stocks are the refiners' contribution, while the marketers are abandoning the fixed policy of nearly a year of "hand to mouth" buying. For the first time in many months the jobbers are building up their storage.

Marketers' Reaction

The marketers, or so-called brokers, in Chicago district do not manifest the skepticism with which they have greeted other sudden price advances. For one thing, there are good indications that "short selling" does not figure as a threat, and that the comparatively small quantity of material moving currently on a flat price basis of around 2½ cents is practically out of the picture. It was learned today that the refiners who are still operating are well up on their shipments, and thus another factor is added to the better relationship between buyer and seller in the wholesale end.

There has been no expression of fear that the lowered crude oil runs by refiners will have an adverse effect on the crude oil markets. One of the largest refiners in the territory, who is also an important crude oil producer, says that the effect is one of strengthening rather than weakening the crude oil structure. "Right at this time," says this operator, "we are on the bare outer edge of the main consumption season and the lowered refinery runs will be reflected in slight increases of crude oil in storage. However, as the season progresses, and if crude oil production continues to be held in, especially in East Texas where the outlook is more cheering than ever, there will be heavy drains on the accumulated oil. As long as gasoline remains around 3½ to 4 cents there is no reason to expect crude oil prices to advance, but there is likewise no reason why selling of refined products should not return to a sane basis, and I, for one, can see in the present movement a goal of prices closely approaching those of normal times. Refiners can't continue to lose money long, as evidenced by the many shutdowns of the past few weeks, and there is the strongest proof that a complete change of heart has taken place among crude oil producers and royalty owners in favor of curtailed production. As I see the situation, there isn't a dark cloud in the sky."

This executive pointed out that bills now before the legislators in Washington would have mixed effects upon the oil industry. The 4-cent tax on lubricating oils, which state legislatures may view with chagrin, will certainly have the effect of making oil changes much fewer and farther between, while the tax on imports of crude oil and refined petroleum products may aid the domestic markets. However, one may reflect that resulting price advances, while sure to benefit the Government, are not likely to enrich the producers. The unpredictable mental slant of laymen is expressed editorially in the Chicago Tribune in which it is sagely stated that additional taxes on petroleum products may have the effect of increasing the price to the consumer. There was no editorial comment on the ironic procedure of the Washington solons who blissfully laid more taxes on the oil industry and then slashed the appropriations for the petroleum division of the Bureau of Mines 37 per cent although a cut of only 5 per cent had been recommended in committee. As one major refiner said, "It appears that gasoline will continue to be classified with cigarettes, cosmetics and playing cards, until the so-called brains of the oil industry become as vocal and active in propaganda as dry goods merchants and grocery chain owners."

Early Spring Expected

Although the district has been in the grip of the longest cold wave of the winter, the expectation, based on meteorlogical information and otherwise, which jobbers and marketers are backing by putting material into their storage tanks, is that real spring weather with its expansion in gasoline demand is due to begin this week or next. This consideration, among others, has placed the markets more in the hands of the refiners, and reports show that the refiners are determined to get better prices. A check with the marketers found all of them, noting the exceptional few who were "caught" by the advance, bullish, withal freely admitting that if conservative operations were the keynote of betterment they could share the honors with the refiners because they had decided, individually, not to sell a car unless they could get the right price. A few said that they might let a car go an eighth of a cent under for "spot cash," because they considered the discount justified.

Elimination of the weak spots in the markets will probably have the effect of making several of the contracts one hears about consistently in the district more inviting. From several sources considered reliable it is reported that a refiner is offering an agreement which quotes a fourth of a cent below the low of a daily publication and adds a rebate of a fourth of a cent in 30 days. Other persistent reports are even worse, and there is some satisfaction in the fact that there has not been the least verification. It appears logical that the secrecy of such operations could not be maintained if the operations were at all extensive. The few instances in evidence now in which prices below the low mark of the ruling markets are on large movements and the resale price is well in line with current prices.

The marked tendency to widen the range between the low octane gasoline price and that of the middle and high octane grades, has received a setback, possibly temporarily, in the district. The projected half-cent differential between the low octane and the middle octane has been shaded down to three-eighths of a cent, and the three-quarters of a cent spread between the low octane and the high octane grades has been moved down to five-eighths of a cent. This settling down process was accelerated by the action of one refiner in the district who placed 100 cars of the middle octane gasoline on the market at three-eighths of a cent above the price of the low octane material.

The quantity of gasoline in any of the octane ranges on the open market nowhere approaches that available a few weeks ago when marketers in the territory were saying that the purchase by refiners of about 300 cars of gasoline would eliminate various soft spots. In Chicago district oil trade circles the thought is prevalent that the huge gasoline stocks held by refiners represent peak preparations for the entrance of the main consumption season and do not constitute a threat to the markets, and this is being borne out by reports of continued lowered operations at the principal refining points. Two of the largest refiners in the territory said Monday that they had moved their gasoline prices above the high of the ruling markets as far as the spot business is concerned and that the material they failed to sell now would certainly be moving before many days were passed. One of these quoted a price of 3¾ cents on the middle octane material on the 125 to 150-car business of Benzoline Motor Fuel Co., last week, and said the bid was made with the certainty that it would be turned down, because "these prices will look sick long before the order is out of the way."

A Misunderstanding

Marketers and jobbers in the district have apparently taken seriously the reports that interests are at work against them. Alleged ill-advised statements, according to the marketers, have been made with the intention of affecting the relationship which has existed between the marketer and the refiner. The effect of these statements, it is said, has been to cause the jobbers and marketers to feel that the larger companies are seeking to "freeze" them out, with the result that the jobbers have associated their interests with those of the marketers as against the refiners.

"Barring meddling by would-be savants of the industry," one marketer said, expressing the sentiments of the majority of his colleagues, "we get along with the refiners not only without friction, but with mutually recognized benefit. We save the medium and small refiner the heavy expense of a large staff of salesmen; we know all the ropes including whom to sell to and whom to avoid. We can handle orders which call for Pennsylvania kerosene and bright stock, Mid-Continent gasoline, East Texas natural gasoline, Gulf Coast neutrals and Eastern naphthas, and not many refiners are in a position to do this. Most of us have been in the business here from a dozen to 20 years, and it can hardly be doubted that we can make better sales than a lot of new men traveling over the territory. In fact, the only trouble we had last year was with sales representatives who used hotel rooms for offices and who thought that a stroke of real salesmanship meant quoting from a quarter to three-eighths of a cent below our prices."

Gasoline Tank Car Markets

The gasoline tank car markets, as pointed out above, showed a sharp advance over last week's quotations in the face of the most adverse weather conditions encountered throughout the winter. The higher test gasolines did not advance as strongly as the U. S. Motor grade and the 400-endpoint material. It is pointed out that in the matter of endpoint the U. S. Motor gasoline is now considerably below 437°, with the result that the price of the 60-62 400-endpoint gasoline will not show the difference it has in the past. The advances covered the entire list of gasolines, and Monday registered as follows: U. S. Motor gasoline advanced from a range of 3 cents to 3¼ cents to a range of 3½ cents to 3¾ cents, with two majors posting prices of 4 cents on the low octane material. The low of the middle octane material is 3⅞ cents, and that of the high octane gasoline is 4⅛ cents. The endpoints range from 415° to 425°. The 60-62, 400-endpoint low octane gasoline moved up from a range of 3¼ cents to 3½ cents to a range of 3⅝ cents to 3⅞ cents. In the 400-endpoint gasoline the price differential between the low octane and the middle octane is a quarter of a cent, with a premium of an additional quarter of a cent for the high octane gasoline. The 64-66, 375-endpoint gasoline, and the 68-70, 360-endpoint material showed advances of only an eighth of a cent, and while the supply of the materials is far from plentiful, it is pointed out that seasonal considerations have a hand in holding the price to slight improvement. The 64-66, 375 gasoline moved from a range of 3¾ cents to 4 cents to a range of 3⅞ cents to 4⅛ cents, while the 68-70, 360-endpoint gasoline advanced from 3 cents to 4¼ cents to a range of 4⅛ cents to 4⅜ cents. There is a somewhat better outlook for aviation fuels, and there appears to be less emphasis on undercutting practices. The fighting grade, which is abnormally low even in an abnormal market, advanced a quarter of a cent to a range of 4¾ cents to 5¼ cents.

Naphtha Tank Car Markets

The naphtha markets appear firmer as a whole, with the blending material advancing from 2⅞ cents to 3⅛ cents to a range of 3¼ cents to 3½ cents with most of the naphtha moving on the higher level. Some of the blending naphthas with especially good antiknock ratings are offered at these top prices to resellers. The current low natural gasoline markets are responsible for the large blending naphtha demand.

Changes are being urged in the Stoddard naphtha specifications and the modifications suggested would certainly have the effect of increasing the price of the material considerably. It was suggested at a recent meeting in Cleveland that the new distillation range for Stoddard naphtha should be as follows: Initial, 300°; 50 per cent point, 330°; 80 per cent point, 340°; 95 per cent point, 360°; and endpoint, 400°. Minimum flashpoint would be at 100°. Makers of the naphtha countered this proposal with a proposition to waive the initial, the 95 per cent point and the flash, expressing the specifications thus: Not less than 50 per cent over at 330°, and not less than 80 per cent over at 350°, with minimum flash at 80°, if the present cost to the buyer is to be maintained. The naphtha producers said that the proposers of various new specifications apparently do not realize that the manufacture of special naphthas involves the production of ends behind and in front of the cut wanted, and these ends or fractions are not always readily salable. The special naphtha business, from the standpoint of the utility of the products and the expensive materials they replace in industry, as well as from the standpoint of the special refining operations called for, should bear no relation to the gasoline markets, according to naphtha sellers. The production of a toluol of a benzol substitute requires that the very heart of the gasoline fraction be taken out by a very closely controlled operation. While the cut is considerably longer for a cleaner's naphtha or a paint thinner, other specifications are involved which do not

(Continued on Page 64)

East Coast Buys More California Gas

Six Cargoes Closed in Open Market. Refinery Gasoline Easier as Stocks Accumulate. Kerosene Sales Better, Fuel Oil Firmer

By A. E. Mockler
New York Bureau, The Oil and Gas Journal, Rooms 1919-21, No. 154 Nassau Street

NEW YORK, Mar. 14.—California gasoline will resume its place as an important factor in East Coast tank car markets during the spring and summer months, it was learned here, following the closing of contracts for more than 400,000 bbls. of the Pacific Coast motor fuel for shipment East.

Union Oil Co. is reported to have closed a contract for approximately 400,000 bbls. of U. S. Motor gasoline, to be shipped to an independent marketer, and to be laid down either at Baltimore, Md., or Tiverton, R. I., with the likelihood that deliveries will be made at both ports. The price at which this business was taken was not disclosed but is believed to be on a competitive level.

Another large California seller was reported to have sold a cargo of approximately 80,000 bbls. for March shipment to either of the foregoing ports.

The first shipment on the five-cargo contract will be made late this month, it is indicated, with other deliveries to be made over the spring and summer season.

With the curtailment of shipments to the East Coast by Richfield Oil Co. some months ago there has been a sharp falling off in California gasoline deliveries on the Atlantic Seaboard, and relatively little of this material has found its way to the open market. Total receipts of California gasoline at Atlantic and Gulf Coast ports during the first two months of 1932 (practically all of which were at Atlantic Coast ports), amounted to 1,307,000 bbls., as contrasted with 2,951,000 bbls. received during the comparable months of 1931, 3,251,000 bbls. in the first two months of 1930, and 3,112,000 bbls. in January and February of 1929.

Aside from the closing of the California gasoline contracts, the East Coast market for refined products was again a rather quiet affair during the past week. While the position of the gasoline market for the country as a whole showed some improvement during the week ended March 5, stocks at East Coast refineries continued to pile up, totaling 6,619,000 bbls. as of March 5, against 6,363,000 bbls. at the close of the previous week. This continued unfavorable trend in the statistical position of the market further undermined sentiment among buyers and sellers alike, and price cutting in tank car sales, which had previously been confined to the lower grades of U. S. Motor spread to gasoline of 65 octane number and higher.

The fuel oil situation was looking better, and East Coast refiners were keeping close watch on the Philadelphia area, where leading sellers are making a determined effort to advance the general market 10 cents a barrel.

Steamship Interests Concerned

East Coast steamship interests are showing considerable concern over the oil tariff situation. With present indications pointing to the probability of a 1-cent import duty, the possibility of a sharp advance in bunker prices is receiving considerable attention. While leading steamship operators are deferring plans until the higher costs actually materialize, there is a strong possibility that in the event of the indicated increase in bunker oil costs considerable bunkering business now handled at eastern ports be diverted to foreign ports, particularly in the case of vessels running to ports where low-priced Rumanian or Russian fuel oil can be bunkered. In such instances, it is believed, any sharp advance in bunker oil prices at United States ports would result in these vessels bunkering for a round-trip voyage while abroad.

Leading refiners selling in the bunker oil market have named 95 cents per barrel as their guaranteed "top" price during 1932, but have protected themselves against any higher prices brought about by tariff or sales taxes. Some sellers, however, in their rush for gallonage on 1932 bunker oil contracts, are understood to have left themselves open to the extent where they may be called upon to absorb the higher costs incidental to new taxes on the sale of bunker oil.

Refinery Gasoline

Business in the tank car market fell off somewhat during the week, the record cold weather experienced throughout the East during the period restricting consumption somewhat. With refinery stocks still on the increase in this area, jobbers were loath to carry full storage stocks, and consequently new business was largely hand-to-mouth in character.

The posted price for U. S. Motor gasoline of 65 octane number or higher, in tank car lots, remained at 6½ cents per gallon in the case of most major sellers, but considerable price competition had developed, and 6 to 6¼ cents per gallon was more representative of the actual market on these grades during the week.

For U. S. Motor gasoline of less than 65 octane number the market ranged 5½ to 5¾ cents per gallon in tank car lots, with a moderate movement reported. It is reported that considerable contract business on the lower grades is in the making, with large shipments from the Gulf Coast area expected to get under way with the advent of warmer weather.

The competitive situation in the South Atlantic area has been complicated somewhat by the entry of a new refiner into that field, and refiners are keeping close watch on conditions in that territory.

May Unsettle Market

Considerable interest is shown in refinery circles here over the larger movement of California gasoline into this area which is in prospect for the near future. It is reported that the Pacific Coast product will be laid down at a competitive price basis, and it is expected that some market unsettlement will develop if the movement of California gasoline shows any sustained substantial increase.

The tanker Raila docked at Baltimore during the week, with a cargo of approximately 3,000,000 gallons of Rumanian gasoline. All of this motor fuel, it is understood, is being transshipped to Detroit via tank car.

Tank Wagon Gasoline

There were no general revisions in the tank wagon or service station price structure in East Coast territory during the past week. Gallonage fell off somewhat, due to inclement weather.

Considerable irregularity in price schedules continues throughout the territory, due to local price cutting to meet the quotations of independent marketers who are still shading the established market level in many sections.

In Metropolitan New York, leading brands of motor fuel can be had at filling stations at 8 gallons for $1, including the state tax of 3 cents per gallon. This low price, taken in conjunction with the higher distributing costs in New York City, means an extremely low net-back to the refiner.

The colder weather has stimulated the retail demand for premium quality motor fuels, marketers report, and current sales of the higher antiknock grades are running at the highest levels attained thus far in the season. Established price differentials between regular grades and premium quality gasolines are being rigorously maintained in most parts of the territory.

Kerosene

Colder weather has stimulated kerosene demand considerably, and there was a good movement in the tank car market this week. The posted quotation for 41-43 water white holds unchanged at 5½ cents per gallon, in tank car lots at refinery terminals, and although some oil can be had at 5¼ cents, the amount of off-priced kerosene is not as large as has been the case during recent weeks. Continuance of the present cold spell, refiners believe, will be reflected in a higher kerosene market.

Tank wagon gallonage on kerosene has expanded materially during the period under review, and prices are firmly held throughout the area. With cold weather making for heavy sales at the present time, and the spring consuming season just around the corner, marketers are optimistic regarding the possibility of a continued firm retail market well into the summer months.

Lubs

Better buying of cylinder oils has put the market in firmer position, and spot quotations were advanced on a number of grades during the past week. Spot 600 steam refined is now held at 20 to 21 cents per gallon, 1 cent over previous quotations, while 600 Pennsylvania flash and 630 Pennsylvania flash are 1 cent higher at 24 and 25 cents and 27 and 28 cents per gallon, respectively. Bright stocks are also 1 cent per gallon higher at 29 to 30 cents for the light and 28 to 29 cents for the dark.

Buying interest has quickened considerably now that it is apparent that the market has touched bottom, and considerable quantities of oil have been bought both for immediate shipment and for delivery over the second half of March.

Eastern refiners, it is understood, have cut their production of cylinder oils and the balance between production and consumption has been restored to a more equitable basis.

There was no change in the situation with respect to industrial lubs, prices for which remained unaltered throughout the week.

Gas Oil

Spot buying of gas oil picked up somewhat last week, and contract movement was also a little better. The local market for 28 plus recycled oil remains unchanged at a range of 3½ to 4 cents per gallon, in tank car lots, at terminals.

A large cargo of California gas oil is due at Baltimore during the next several weeks, representing a delivery on a contract held by Union Oil Co. of California with the Baltimore Gas Co. With the current tanker rate on gas oil shipments from California 30 cents per barrel, Pacific Coast sellers, who are understood to be carrying large surplus stocks of gas oil, are in good position to compete with East Coast refiners for business on the Atlantic Seaboard.

East Coast refiners have curtailed their production of gas oil somewhat during recent weeks, it is reported. Stocks of gas and fuel oil held at East Coast refineries on March 5 amounted to 6,500,000 bbls., a drop of 387,000 bbls. for the week.

Fuel Oil

Continued improvement in market sentiment is discernible in the bunker oil division this week. The posted price remains unchanged at 60 cents per barrel, bulk, f.o.b. terminals, and contract deliveries, as well as spot business, held up well during the period.

Philadelphia sellers continue to quote 70 cents per barrel for bunker oil in many instances, and if the Philadelphia market succeeds in establishing a 70-cent quotation it is felt that other principal East Coast ports will follow.

Possibility of a tariff of 1 cent per gallon on imported fuel oil, has aroused widespread interest, both in refining and consuming circles. With the current price of fuel oil 60 cents per barrel, a 1-cent tariff would indicate a market of $1.02 per barrel on imported fuel oil. In local trade circles it is considered doubtful if foreign fuel oil could stand an import tax of 42 cents per barrel, and it is thought that establishment of an import duty at this level would bring about a pronounced falling off in shipments of bunker oil from Mexico and South America into United States ports.

Diesel Oil

Market conditions were without change during the week, and refiners continued to hold the posted quotation at $1.30 per barrel, in bulk, at marine terminals. Contract withdrawals were up to expectations, but spot gallonage continued rather light.

Diesel oil imports are expected to be eliminated in the event of the imposition of a 1-cent per gallon import duty, but in as much as relatively little Diesel oil is brought in from Mexico or the Caribbean refining area, the proposed tariff will have little effect upon the general market.

With Rumanian and Russian Diesel oil furnishing sharp competition in European ports, there is some interest shown in refining circles in the possibility that any sharp advance in Diesel oil prices here will cause vessels in the European run to curtail their bunkering activities at Atlantic ports in this country, and load sufficient supplies for round-trips while in European ports where competing Diesel oils are available at relatively low price levels.

Paraffin Wax

Sellers have advanced their prices sharply all along the line, in sympathy with increases named by refiners, but buying has not yet developed to an extent sufficient to test out the new price levels. For spot 120-122 a.m.p. fully refined sellers are asking 2⅞ cents per pound, up one-quarter cent, with 125-127 a.m.p. showing a corresponding advance at 3⅛ cents and 130-132 a.m.p. at 3⅝ cents. Advances of one-eighth cent per pound have been made on 133-135 a.m.p. and 135-137 a.m.p. at 4⅛ and 4¼ cents per pound, respectively.

Comment in market circles indicates that refiners will have difficulty in maintaining the market at the higher levels, and the belief is expressed that a trading level will be reached at about one-eighth cent per pound under refiners' current asking levels.

Export Market

There were no cargoes sold for export at the Gulf during the week and posted prices were unchanged on both gasoline and kerosene. A definitely stronger undertone had developed on export gasoline, however, and operators here were of the opinion that the 4⅛ cents inside quotation on U. S. Motor would be short-lived, and that higher gravities were also due for an early rise.

Widespread interest was created in market circles by the revised plan for a world agreement, submitted by J. B. Aug. Kessler of the Royal Dutch Co., although it was generally felt that the import tariff situation in this country would considerably complicate the situation, and probably force further revisions in the plan's provisions.

Rumania and Russia continue to afford strong competition to American sellers in the British and Continental mar-

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kets, and no new cargo inquiries were submitted to American sellers during the period under review.

Petroleum Exports

Export movement of refined petroleum products out of the local port was again off during the week ended March 5, volume being lower on all of the major products.

The following table shows refined petroleum exports for the past three weeks (all figures in gallons unless otherwise noted):

	Week ended		
	Mar. 5	Feb. 27	Feb. 20
Gasoline	25,000	260,000	120,000
Naphtha	8,000	500,000	5,000
Kerosene	70,000	48,000	250,000
Fuel oil	160,000	9,000	5,000
Lubricating oil	620,000	1,105,000	2,451,000
Petroleum, ref'd	80,000	195,000	705,000
	Pounds		
Paraffin wax	645,000	775,000	1,225,000
Refined	.....	460,000	35,000
Scale	410,000	.....	500,000
Lubricating grease	675,000	425,000	1,040,000

New business did not develop in the local export market to any material extent during the week. Europe is not counted on as an active factor for the next few months, but operators here are anticipating some revival in demand from South America. While Soviet sellers are coming into South American markets in a larger way, American sellers are meeting with more success in countering this competition in principal markets on the Southern continent than has been the case with Russian and Rumanian sales competition in Continental markets, where American refined products have been displaced to a considerable extent.

Imports

Imports of crude and refined petroleum at the principal United States ports for the week ended March 5 totaled 1,597,000 bbls., a daily average of 228,143 bbls., compared with 2,180,000 bbls., a daily average of 311,429 bbls. for the previous week, and a daily average of 253,827 bbls. for the month of February. Details follow:

	Bbls. of 42 gals.
At Atlantic Coast Ports—	
Boston	58,000
New York	1,098,000
Philadelphia	178,000
Others	70,000
Total	1,404,000
Daily average	200,571
At Gulf Coast Ports—	
New Orleans and Baton Rouge	193,000
Total	193,000
Daily average	27,572
At All United States Ports—	
Total	1,597,000
Daily average	228,143

Distribution of total imports for the week ended March 5 was as follows:

Crude	1,093,000
Gas oil	78,000
Fuel oil	426,000

California Oil Receipts

There were no receipts of California crude or refined petroleum reported at Atlantic or Gulf Coast ports during the week ended March 5.

Total receipts for the month of February were 566,000 bbls., a daily average of 19,517 bbls., as compared with 916,000 bbls., a daily average of 29,548 bbls., during the previous month.

OPTIMISM SHOWN IN CHICAGO OIL CIRCLES

(Continued from Page 62)

confront the manufacturer of motor fuel. Naphtha tank car prices Monday were as follows: Cleaners' naphtha, 5⅝ cents to 5⅞ cents; lacquer diluent, both grades, 9 cents to 9¼ cents; rubber solvent, 5¾ cents to 6¼ cents; Stoddard solvent, 4⅞ cents to 5⅛ cents; petroleum thinner, 4⅝ cents to 4⅝ cents; V.M.P. naphtha, 5¼ cents to 5½ cents; and petroleum spirits, 3⅞ cents to 4¼ cents. The naphtha tank wagon markets continue spotty, with many price concessions heard in such centers as Detroit, St. Louis and Minneapolis, where sellers have increased the marginal spread a cent in most instances.

Kerosene Tank Car Markets

The kerosene tank car markets are showing signs of strength although the spring demand has not yet materialized. The 41-43 water white kerosene moved up to a range of 2⅝ cents to 2¾ cents, and the 42-44 water white material was quoted at 2¾ cents to 3 cents.

Gas Oil and Fuel Oil

The only betterment noted in these materials applies to the heavier fuel oils resulting from increasing inquiries from industrials. The 38-40 and the 32-36 distillates eased down an eighth of a cent due to the unloading of these materials and the approaching termination of the burning season.

CALIFORNIA FIELDS

(Continued from Page 44)

handling this oil even for fuel oil purposes. Some little additional development is also getting under way in the Mount Poso and Round Mountain Fields. Most of this drilling in all three fields is being done by independent operators.

The Shell Oil Co. has started to open up some of its wells in the Coalinga Field of Fresno County and, while this is ostensibly being done to determine whether there has been any water infiltration, it is interesting to note that it will be necessary to produce oil in order to make a final decision. The Shell shut in these wells several years ago because of curtailment work. When this was done, the company shut in every one of its wells at Coalinga and moved its employes to Long Beach. It is the general opinion that the Shell will keep a few of its Coalinga wells on production after completion of its survey work as its properties in this field are capable of producing 17,100 bbls. per day.

ROCKY MOUNTAIN AREA

(Continued from Page 40)

of the week at Fort Morgan in the litigation involving the William Schmidt 320-acre lease in Sections 18 and 19-6n-60, one of the most valuable untested tracts in the Greasewood area. It lies to the east of the producers. The Platte Valley company claims the lease under an agreement made in June, 1930, before the discovery well came in. The Independent Oil & Refining Co. has a sublease from the Platte Valley company on 160 acres and has a derrick up in the C NE NW Section 19-6n-60. It is understood that the Continental Oil Co. also claims a lease from Schmidt that was secured after the alleged default occurred.

The Platte Valley Petroleum Co.'s No. 1 Patterson, NE SE NW Section 24-6n-61, the discovery well, which went off production two weeks ago, recemented the 4¾-inch on top of the sand at 6,667 feet and has cleaned out to 6,664 feet. Operations had to be suspended for a few days on account of the cold weather. The water which showed in the well is believed to have come from above. The well has produced since October, 1930, with the 4¾-inch suspended 70 feet off bottom. When production stopped, this string was underreamed and lowered to the top of the sand.

The Reiter-Foster Oil Co.'s No. 1 Johnson-Juhl, C SE SE Section 14-6n-61, which has been attempting to cement off water in the Dakota, recemented and then swabbed the hole clean to 6,548 feet when operations were suspended on account of the storm. It is planned to shoot off the 7-inch and test a show in the Timpas at 6,260-70 feet.

The Continental Oil Co.'s No. 1 Gadbois, C SE SW Section 24-6n-61, upon which swabbing and testing has been in progress in an effort to increase production in the Muddy at 6,670-90 feet, has the tubing in the derrick, but had not started running it when the storm broke.

Adams County

The Hills Dome Lease Development Co.'s No. 1 Hills, SE cor. Section 27-3s-64, near Watkins, had the crew on the lease and was ready to begin running tower at 3,790 feet when the cold weather caused a delay for a few days.

Lincoln County

The Eastern Colorado Oil Co.'s No. 1 State, SE cor. NW Section 36-14s-57, near Hugo, is bottomed at 3,425 feet, where it was estimated to be only 10 feet off the Dakota, when a second string of

tools was lost in the hole. It had been sidetracking.

Larimer County

The Mayer Oil Co.'s No. 1 Reed, SW cor. NW Section 28-4n-69, Berthoud district, is shut down at 3,150 feet on account of the storm.

Jefferson County

The Ruby Hill Oil & Gas Co.'s No. 1 Braden, SE cor. Section 24-4s-69, near Denver, is drilling at 4,200 feet in sandy shale.

Moffat County

The Ohio Oil Co.'s No. 1 Bogenschultz, C SE SE Section 9-6n-61, Craig Dome, is expected to make a test of the sand in the lower Mesa Verde topped at 2,781 feet within the next few days. The 8¼-inch was landed on bottom, but caving caused it to buckle and a string of 6¼-inch was run and cemented at 2,781 feet. The sand at this depth showed considerable gas through a large volume of water which broke in from behind the 12½-inch at 1,734 feet. The caving shut off the water, but it was decided to take no chances and the smaller string was run. If the well is commercial at this depth, the construction of a pipe line to Craig to supply that town with gas will start at once.

Rio Blanco County

The California Co.'s No. 1 California-Raven, NW NE Section 30-2n-102, Rangely Dome, is drilling at 3,696 feet after cementing the 13⅜-inch at 3,575 feet.

WYOMING

Park County

A completion of more than ordinary importance was reported in the Frannie Field in Park County in the Midwest Refining Co.'s No. 4 Rosenberg, NE NW NE Section 26-58-98, which at a total depth of 3,295 feet swabbed 225 bbls. in four hours and is estimated at 700 to 800 bbls. per day. The well, which gives evidence of being the best one so far completed in the field, is located on the west flank and 530 feet down from the top of the structure. It is one-fourth of a mile out from No. 1 Rosenberg, NE cor. Section 26, the nearest producer, and proves up considerable territory.

The well was drilled with a rotary by the Rocky Mountain Drilling Co., contractors, to 3,248 feet, where the 8¼-inch was cemented and the hole standardized. It topped the Embar at 3,225 feet and found the top of the pay at 3,275 feet. At 3,295 feet, where drilling stopped, it showed no water whatever. An interesting feature of the completion, aside from the extension of the pool, is the size of the well. Wells on top of the structure made from 150 to 300 bbls. per day when first brought in. No. 4 Rosenberg, which is 530 feet down structure, is rated at more than twice the size of the largest wells on top. It is considered unusual to find the bigger wells 400 to 500 feet lower on structure. C. T. Lupton, of Denver, who mapped the Frannie Dome and who spotted the Rosenberg well, says that its size may be due to low hydrostatic pressure which prevented the main body of oil from being crowded to the top, or to the character of the sand. The structure has a closure of 1,000 feet and this completion indicates that it is at least half full of oil.

The increase in the size of the wells as they are drilled down structure is emphasized in two other wells on the same section. No. 1 Rosenberg, one-fourth of a mile to the east, averaged 631 bbls. daily the last 10 days of a 65-day test, and No. 24 Rosenberg, one-third of a mile to the southeast, averaged 578 bbls. daily on a similar test. No. 4 Rosenberg will be put on the pump for 65 days to establish a 10-day average at the end of the test. The Madison lime, which yields the big production at Garland, has been drilled in one well only on the Frannie Dome.

The Resolute Oil Co., which drilled the discovery well on the Badger Basin Dome, the deepest well drilled in the Rocky Mountain states, has made a location on its state lease in Section 16-57-101, half a mile to the north of the producing well. It will be drilled with a rotary and operations are expected to get under way early in the spring.

Big Horn County

The Crystal Oil & Refining Co.'s No. 1 Empire State, NW SW SW Section 5-54-93, Crystal Creek, has suspended at 1,805 feet and may resume in the spring.

Weston County

The West Osage Oil Co.'s No. 2, SE cor. NE Section 15-46-64, Osage Field, is still making around 200 bbls. per day after being on production for two weeks. It made better than 300 bbls. initial.

Julius Peters and others' No. 1 Witzell, SE cor. NW Section 30-46-64, Fiddler Creek, is preparing to resume at 3,400 feet after being shut down for the winter.

Carbon County

The Lost Soldier Producing Co.'s No. 1, NE NE Section 25-56-88, Mahoney Dome (also carried as Ray Dane and others), has recovered lost tools, which has delayed completion for a long time, and is shut down at 3,772 feet until spring when it will be drilled on down to an 80-foot sand at the bottom of the Sundance. At its present depth in the top of the Sundance it has a very good show of oil with several million feet of gas.

The first of the Salt Creek companies to make its annual report to stockholders is the Salt Creek Producers Association. Production, after deducting government, state and other royalties, of its subsidiaries, was 2,181,811 bbls. in 1931, for which it received $1,440,143, including the value of casinghead gas. This compares with 2,724,515 bbls. in 1930, for which it received $2,411,703. Net before depletion and taxes was $1,508,023. Reserve for taxes was $114,740, and for depletion, realization of discovery value and adjustments for prior years was $1,924,383. Dividend payments amounted to $2,113,172. Current assets, including $670,653 in cash, bonds at cost and storage oil at posted price at time of storage, amounted to $8,881,947, and current liabilities were $100,210.

The Illinois Pipe Line Co. has voluntarily withdrawn its application to the Wyoming Public Utilities Commission for permission to abandon its pipe line from the Pilot Butte Field to Riverton in Fremont County.

MONTANA

Carbon County

The Ohio Oil Co. has made a location in the eastern part of the Dry Creek Field on the Margaret Caldwell tract in Section 12-7s-22. It is about midway between No. 1 Armstrong, a completed well, and No. 1 McMinn, a drilling well, of the Carbon Oil & Gas Co., and slightly to the west, being 330 feet back from the lease line. An understanding as to the spotting of wells has been reached in order to reduce offset drilling.

The Ohio company's No. 2 Montana Industrial, C NW SE Section 11-7s-21, is drilling at 2,686 feet, and its No. 2 Robinson, C SE SE Section 3-7s-21, is drilling at 200 feet.

The Carbon Oil & Gas Co.'s No. 1 McMinn, NW SW SW Section 7-7s-22, is drilling at 2,110 feet.

The Ohio Oil Co.'s No. 1 Kuchinski, NW SE NE Section 15-7s-22, Golden Dome, is drilling at 4,667 feet.

The Corbett Royalty Co.'s No. 1, SW cor. SE Section 1-6s-23, Blue Creek district, recemented the 8¼-inch at 1,120 feet and is cleaning out.

Cascade County

Charles Merz and others' No. 1 Sheffelt, SE NW Section 4-21-4e, Black Horse Lake, is shut down for the 6-inch at 905 feet.

Fallon County

McDonald and others' No. 3, C SW Section 28-8n-60, Cedar Creek, recemented the 8¼-inch at 1,682 feet and is cleaning out.

Glacier County

The Fulton Petroleum Co.'s No. 1 Blackfeet, SW NE NE Section 28-36-12w, is shut down at 2,950 feet to install rotary.

Toole County

The Oregon Oil Syndicate's No. 1 Barthelote, SW NE SE Section 20-36-2e, Barthelote district, is drilling at 2,320 feet.

Liberty County

The California Co.'s No. 1 Ross, NE

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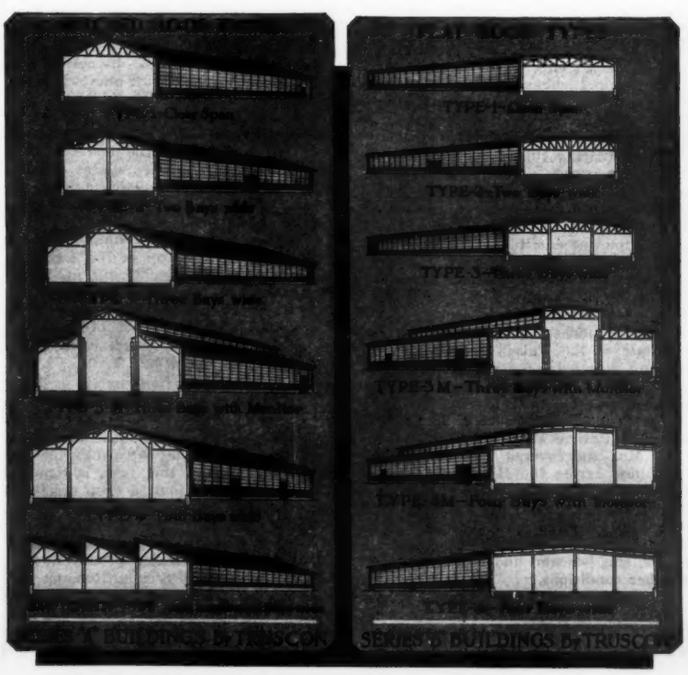


SE NE Section 3-33-6e, Utopia district, is drilling at 2,780 feet with the 8¼-inch at 2,700 feet.

Yellowstone County

Peter Antonilo's No. 1 Happy Hollow, NW cor. NE Section 21-2n-25, is shut down at 2,470 feet with casing shoe in the hole.

Pipe Line Runs

Average daily pipe line runs for the week ended March 12:

	Bbls.
WYOMING	
Salt Creek	23,030
Badger Basin	50
Big Muddy	1,680
Byron-Garland	1,150
Dallas-Derby	460
Dutton Creek	70
Elk Basin	600
Ferris	40
Frannie	10
Grass Creek	1,970
Hamilton Dome	760
Hudson	420
LaBarge	780
Lance Creek	90
Oregon Basin	570
Lost Soldier	2,730
Midway	120
Osage	710
Pilot Butte	30
Rock River	1,710
Poison Spider	30
Teapot	10
Total Wyoming	37,020
MONTANA	
Buckley-Border	490
Cat Creek	930
Dry Creek	300
Kevin-Sunburst	3,200
Lake Basin	60
Pondera	1,160
Total Montana	6,140
COLORADO	
Florence	260
Fort Collins	900
Iles	800
Moffat	780
Orchard	330
Rangely	20
Tow Creek	330
Total Colorado	3,420
NEW MEXICO	
Rattlesnake	725
Hogback	170
Table Mesa	80
Artesia	458
Cap Rock	650
Hobbs	30,635
Jal	908
Lea City	2,036
Eunice	400
Texas Pacific	200
Total New Mexico	36,262
Total Rocky Mountain area	82,842
Total previous week	84,206
Difference	1,364

ENGINEERS DISCUSS PIPE LINE PROBLEMS

(Continued from Page 13)

Sand Springs, Okla. These stations were described in detail in articles appearing in The Oil and Gas Journal of November 19 and December 17, 1931.

There were only a few small details that required change after the stations were put into operation and they are described in Mr. Horne's paper, printed elsewhere in this issue of the Journal.

Repairing Pipe Line Leaks

The next paper was by J. J. Boyd, engineer, Stanolind Pipe Line Co., Tulsa, giving detailed description of two repair jobs done by that company on Mississippi River pipe line crossings. The paper was fully illustrated and clearly explained this work and proved of much interest to the engineers who heard it.

Afternoon Session

After a luncheon served in the assembly hall of the Tulsa Club, where the meeting was held, the afternoon session was called to order at about 1:30 and presided over by A. N. Horne.

The first paper was by J. T. English, with the Prairie Pipe Line Co., Kansas City, Mo., and covered "Method of Laying Lines Across the Mississippi River." It described the methods followed in laying three lines and was illustrated by numerous pictures and indicated quite clearly the various details of laying lines across this stream under a variety of weather conditions.

Diesels Geared to Pump

J. B. Harshman, engineer, Stanolind Pipe Line Co., Tulsa, gave a very interesting and complete paper upon the use of "High Speed Diesel Installations Geared to Centrifugal Pumps" in which cost data were presented and the advantages and disadvantages of this type of installation fully discussed.

This paper brought forth considerable discussion as to the relative merits of the Diesel powered and electric motor operated centrifugal pump units. W. H. Stueve, power sales engineer, Oklahoma Gas & Electric Co., Oklahoma City, Okla., presented the electric motor side of the discussion in a very able manner, and several others joined in the general discussion and many interesting facts on both sides of the proposition were brought to light.

Tunnel Under Channel

Frank Hadley, Sinclair-Texas Pipe Line Co., Tulsa, next presented a very enlightening paper upon the recently completed pipe line tunnel under the Houston Ship Channel, and showed a number of pictures and drawings of this work. This has been previously described in The Oil and Gas Journal, but Mr. Hadley added considerable to the details of the undertaking and answered a number of questions asked by engineers giving further information upon several important points.

Gears Used in Oil Industry

Those present at this meeting were favored with an opportunity to hear a paper prepared by John Brandt, of Farrel-Birmingham Co., Buffalo, N. Y., presented by W. E. Sykes, inventor and designer of the Sykes Herringbone gears now so largely used in all industries. A brief review of the history of development of gears was given by Mr. Sykes and then followed by pictures of typical herringbone gears and pinions. This proved a most interesting paper and following it Mr. Sykes answered several general questions about gear manufacture and application.

Cooling Systems for Diesels

Floyd Warterfield, engineer, Oklahoma Pipe Line Co., Muskogee, Okla., presented his paper on "Closed Cooling Water Systems for Diesel Engines." This paper outlined the development of the closed system of cooling Diesel engines and pointed out the many advantages of it as compared with the open type of cooling system. It is presented in full in another portion of this issue and gives a number of very important facts on this subject.

Equivalent Lengths on Pipe Lines

The last paper on the program was presented by William G. Heltzel, chief engineer, Stanolind Pipe Line Co., Tulsa, under the above title and covered numerous formulas used in pipe line design and their application to oil and gasoliné systems. Mr. Heltzel has been working on these data for the past four years and has collected a great mass of information, a portion of which was presented in this paper. It was discussed quite freely by those present and while not ready for publication at this time it is hoped that it will later be released. It is the only paper presented at this session not included in the insert in this week's issue of The Oil and Gas Journal.

All papers and discussion proved the great interest in pipe line problems existing at this time, and point the way to future meetings of this character to be held under the auspices of the A.S.M.E., which will mark development in design. With the work of the various committees of this society on several special problems it is anticipated that much progress will be made in the near future in pipe line designing and operation.

RUMANIAN PRODUCTION

NEW YORK, Mar. 12.—Rumanian production of crude petroleum for the month of January, this year, is reported at 540,000 metric tons, a drop of 20,000 tons from the production of the previous month, and 60,000 tons under the output of 600,000 tons for January, 1931. Astra Romana was the major producer, with 117,266 tons, with Steaua Romana second with 81,820 tons, Concordia third with 70,477 tons, Phoenix Oil fourth with 46,884 tons, and Romana-Americana fifth with a total of 40,108 tons.

PINTS, INCHES, BUSHELS IN CLASS LIKE DECIBLES

(Continued from Page 14)

network of several lines with their associated phones, coils, switching equipment, etc.

2. Having ascertained the db losses over the various "long haul" routes, some standard of limitation must be selected. Practically all telephone engineers agree that the following classifications represent safe practice from the standpoint of both economy and efficiency:

(a) Routes not exceeding 18 db loss are "Easy Commercial."

(b) Routes totaling 24 db are "Commercial."

(c) Routes totaling 32 db are "Commercial Limit."

(d) Routes exceeding 32 db are "Uncommercial."

The above figures must include all line wires and every piece of equipment between the two distant telephones.

CALIFORNIA'S THIRD ANNUAL OIL EXPOSITION

(Continued from Page 13)

Turner Smith, president; George Carrol, vice president, and Merrill Turner, secretary.

The technical exhibits will add greatly to the educational features of the exposition. The American Petroleum Institute will have a most interesting display. The California Natural Gasoline Association will present a display including its new Standard Fundamental Analysis Column. This column will be installed and operated by Edgar E. Shafer, Jr. An exhibit by the National Safety Council will be under the direction of George Prussing, safety engineer for the Union Oil Co.

Another interesting exhibit will be given by the Russian government, under the supervision of N. V. Vannikoff, representative of the All-Union Oil & Gas Industries of the U.S.S.R.

The exposition personnel is composed of E. G. Lenzer, president and general manager; R. E. Zint, vice president and sales manager; W. B. Summers, secretary and business manager; W. A. Sawdon, director of public relations.

CONSTANZA SHIPPED MORE OIL IN 1931

NEW YORK, Mar. 12.—Export movement of refined petroleum products through Constanza, principal Rumanian exporting port, showed a sharp increase during 1931, with substantial gains recorded in the movement of gasoline, kerosene and fuel oil. Shipments for the year, with comparison with 1930 movement, follow:

	Tons	
	1931	1930
Gasoline	1,272,084	682,329
Kerosene	888,833	761,422
Gas oil	692,370	456,836
Fuel oil	993,991	1,031,281
Lubricating oil	37,080	47,390

England was the largest taker of oil shipped from Constanza, with a total of 730,783 tons, of which about 50 per cent consisted of gasoline, with France second with 531,743 tons, of which more than half was gasoline. Other buyers of Rumanian gasoline last year, in the order of their importance from the standpoint of gallonage, were as follows: Italy, Egypt, Spain, Belgium, Germany, Greece, Syria and Palestine, and Holland.

Approximately 50,000 tons of gasoline were sold by a Rumanian refiner during 1931 for shipment to Detroit, U.S.A.

In addition to the Constanza shipments, Rumania shipped 609,222 tons of petroleum for Central Europe, via the Danube, in 1931.

EAST AND EAST CENTRAL TEXAS WILDCATS

(Continued from Page 25)

FRANKLIN COUNTY

Tom Harper's No. 1 fee, 150 ft. from N line and 200 ft. from E line of 116-ac. tr., W. M. Dawson Sur. . . S.D. 1,000 ft.

GREGG COUNTY

Abernathy & Kirkpatrick's No. 1 R. M. Wood, center of Lot No. 3, R. H. Hokit Sur. . . . . S.D. 3,570 ft.

P. J. Alco's No. 1 F. Thomas, 160 ft. from S line and 150 ft. from W line of 10-ac. lease, C. H. Alexander Sur. . . . . Waiting on cmt. to set 45 ft.

Barnsdall Oil Co.'s No. 1 Adams, 330 ft. S and E of NE cor. of Shell's Slaton lease, G. W. Hooper Sur. . . Location.

Will Brown's No. 1 E. Choice, 400 ft. due east of Collins' No. 1 H. T. Elder . . . . . Derrick.

M. T. Beeler's No. 1 Finley and Thomas, 150 ft. from N and 150 ft. from W of 10-ac. lease, C. H. Alexander Sur. . . . . Derrick.

Byrd-Frost Oil Co.'s No. 1 Alexander and Strong, 330 ft. from S and E lines of 26-ac. tract, M. Tennison Sur. . . . . Drlg. 920 ft.

E. L. Chapman's No. 1 J. Clayborn, 275 ft. S and 158 ft. W of NE cor. of 4-ac. lease, I. Baty Sur. . . . . Rig up.

Danciger Oil & Ref. Co.'s No. 1 S. Ball, located on a 2-ac. tract, Mary Van Winkle Sur. . . . . Set csg.; T.D. 3,585 ft.

Degener & Co., Inc.'s No. 1 Savannah Belle, located on 2-ac. tract, Mary Van Winkle Sur. . . . . Moving in rig.

Demotte et al's No. 1 T. L. Bray, center of Blk. No. 8, H. R. Hokit Sur. . . . . Drlg. 3,250 ft.

Dodd and Markey's No. 1 J. F. Holt, 615 ft. E and 707 ft. N of SW cor. of 200-ac. tract, H. Edwards Sur. . . Derrick.

East Texas Refining Co.'s No. 1 J. W. Fuller, 330 ft. from W line and 300 ft. from S line of 50-ac. lease, D. Sanches Sur. . . . . Bldg. derrick.

Empire Gas & Fuel Oil Co.'s No. 1 V. L. Taylor, 330 ft. from N line and 352 ft. from W line of 40.85-ac. lease, M. Tennison Sur. . . . . Running csg.; T.D. 3,712 ft.

Faith Oil Co.'s No. 1 Walters, 246 ft. E of W line and 145 ft. N of S line and SW cor. of survey, B. W. Witcher Sur. . . . . Waiting on cmt. to set; T.D. 1,625 ft.

Farland et al's No. 1 Alexander, center of 10-ac. lease in center of 50-ac. tract, D. Sanches Sur. . . . . Derrick pattern.

B. F. Findley's No. 1 Vine Lodge, center of 1-ac. lease and tract, J. W. Bradshaw Sur. . . . . Derrick.

A. B. Gippert et al's No. 1 L. Bailey et al, center of 6¾-ac. lease, James Norris Sur. . . . . Derrick.

Glasscock Bros.' No. 1 E. Bade, 157 ft. from S line and 409 ft. from W line of lease, G. W. Hooper Sur. . . . . Rig up.

Glasscock et al's No. 1 Duncan, 330 ft. from S and E lines of lease, G. F. Penn Sur. . . . . Drlg. 2,700 ft.

Lewis Godlin's No. 1 E. L. Walker, 330 ft. N of road, 330 ft. from E line of 80.2-ac. tract, M. Dillard Sur. . . Derrick.

Gulf Production Co.'s No. 1 A. King, 120 ft. E and 330 ft. N of SE cor. of church, John Moffit Sur. . . . Location.

Gulf Production Co.'s No. 1 E. L. Walker, 810 ft. N and 370 ft. W of SE cor. of lease, John Tate Sur. . . Moving in.

Gulf Production Co.'s No. 1 Nichols, 330 ft. from N line and 344 ft. from W line of lease, D. Dainwood Sur. . . . . Spudded.

Hastings et al's No. 1 Wallace, due SE offset to Victory Smith's No. 1 Knowles, M. Tennison Sur. . . . . Drlg. 2,000 ft.

J. F. Heard's No. 1 fee, 200 ft. SW of Pace's No. 1 Elder, Mary Van Winkle Sur. . . . . Derrick.

D. M. Hester's No. 1 Crews, 299 ft. W. and 166 ft. S of SE cor. of William W. Friars Sur. . . . . Set csg.; T.D. 3,666 ft.

D. L. Hoffman's No. 1 B. F. Phillips, 330 ft. from E line and center of N and S lines of 16.5-ac. tract, D. Ferguson Sur. . . . . Drlg. 3,525 ft.

Humble Oil & Refining Co.'s No. 1 J. H. Sheppard, 330 ft. from S and W lines of lease, T. Allen Sur. ....Set csg.; T.D. 3,641 ft.
Inland Oil Co.'s No. 1 J. A. Knowles, 150 ft. from S line and 330 ft. from W line of 17-ac. lease, John Blair Sur. ....Rig up.
Jackson and Bradstreet's No. 1 M. Young, center 2-ac. tract, J. R. Crosby Sur. .... S.D. 200 ft.
K. B. Oil Co.'s No. 1 Dickson, 150 ft. from S and 150 ft. from W of 5-ac. lease, Mary Van Winkle Sur....S.D. 700 ft.
Landes et al's No. 1 M. B. Hughey, Blk. No. 118, Kilgore Townsite, Mary Van Winkle Sur. ....Drlg. 2,900 ft.
Lucy Petroleum Co.'s No. 1 B. C. Christian, 330 ft. from W line and center of N and S lines of 8-ac. lease, G. W. Hooper Sur. ....Location.
Magnolia Petroleum Co.'s No. 1 Zeigler, 330 ft. out of NW cor. of 50-ac. lease, B. N. Hampton Sur. ....Location.
McBride's No. 1 F. Elder, 205 ft. N and 320 ft. W of SE cor. of 26-ac. lease, John Wilkerson Sur. ....Rigging up.
National Oil Co.'s No. 1 L. Martin, 330 ft. from N and W lines of 20-ac. lease, W. P. Chisum Sur. ....Drlg. 1,700 ft.
Newman et al's No. 1 A. V. Bacle, 426 ft. S and 250 ft. W of NW cor. of Barnsdall's McGrede lease, G. W. Hooper Sur. ....Location.
A. G. Oliphant's No. 1 W. P. Crews, 330 ft. from S and E lines of 10-ac. lease, J. W. Bradshaw Sur. ....Waiting on cmt. to set.
J. D. Patty et al's No. 1 J. C. McCormick, 207 ft. SE at right angles to Gladewater-Tyler road and 540 ft. SW of Abernathy and Kirkpatrick's No. 1 Gregston, M. Dillard Sur. ....T.D. 100 ft.
Tom C. Patten's No. 1 Geo. Walter, center of 1-ac. tract, and 396 ft. from W line of lease, Mary Van Winkle Sur. ....Drlg. 1,145 ft.
R. A. Payne et al's No. 1 R. M. Woods, 20 ft. from S line and 31 ft. from W line of 2.13-ac. lease, H. R. Holit Sur. ....Derrick.
Peterson and Merritt's No. 1 Hem, center of 1-ac. tract of SW cor. of Meridian's Lee lease, L. J. Rigsby Sur. ....Drlg. 2,450 ft.
Pilot Oil Co.'s No. 1 H. Smith, center of 3,67-ac. lease, William Robinson Sur. ....Rig up.
L. G. Priest's No. 1 Oscar Robertson, 330 ft. from S line and 130 ft. from E line of 5-ac. tract, T. Grace Sur. ....Derrick.
Pruitt and Standberry's No. 1 M. B. Hughey, Blk. No. 150, Kilgore Townsite, Mary Van Winkle Sur. ....Derrick.
J. C. Reese et al's No. 1 Mrs. B. Mosley, 135 ft. from NE line and 105 ft. from SE line of Blk. No. 2, H. R. Holit Sur. ....Top sand 3,618 ft.
Reeves et al's No. 1 W. L. Hestland, center of five-eighths-acre tract, midway from Lampton Church and Sarson's No. 1 Hall, D. Sanches Sur. ....Derrick.
C. B. Robinson et al's No. 1 L. Rodden, 330 ft. W and 225 ft. S of NW cor. of The Texas Company's Woods lease, M. Dillard Sur. ....Drlg. 3,170 ft.
Ross et al's No. 1, located on Findley & Thomas 50-ac. tract, 150 ft. from S line and 6.66-ac. lease, C. H. Alexander Sur. ....Derrick.
Frank Russell's No. 1 M. Dickson, Blk. No. 184, Kilgore Townsite, Mary Van Winkle Sur. ....Rig up.
Shell Pet. Corp.'s No. 1 S. C. Fishborn, 330 ft. from N and E lines of 100-ac. lease, F. W. Johnson Sur.....Location.
Shell Petroleum Corp.'s No. 1 M. J. Register, 370 ft. from N line and center of E and W lines of 50-ac. tract, D. Dainwood Sur. ....Drlg. 2,655 ft.
Showers and Moncrief's No. 1 J. M. Christian, 177 ft. from N and S lines and 265 ft. from E and W lines of 4.33-ac. lease, G. W. Hooper Sur. ....Location.
Silver Star Gas Co.'s No. 1 Knight and Tabor, center of one-half-acre tract, L. B. Outlaw Sur. ....Waiting on cmt. to set 3,603 ft.
R. L. Smith's No. 1 E. E. Anderson, 330 ft. from S line and center of E and W lines of 19-ac. tract, G. W. Hooper Sur. ....Drlg. 3,610 ft.
V. C. Smith's No. 1 M. B. Hughey, center of Blk. No. 123, Mary Van Winkle Sur. ....Rig up.
Victor C. Smith's No. 1 Knowles, center of Blk. 134, Mary Van Winkle Sur. ....Derrick.
Stanolind Oil & Gas Co. and Simms Oil Co.'s No. 1 Akin, 330 ft. from S and E lines of lease, W. H. Castleberry Sur. ....Waiting on cmt. to set 118 ft.
Stroube and Stroube's No. 1 M. B. Hughey, center of 5-ac. lease, L. B. Outlaw Sur. ....Drlg. 2,660 ft.
Sun Oil Co.'s No. 1 G. Reeves, 1,073 ft. from S line and 338 ft. from W line of lease, James Hay Sur. ....Drlg. 3,651 ft.
Thompson's No. 1 Cole, E offset to Petroleum Finance's No. 2 Lacy, M. T. Cole Sur. ....Drlg. 3,170 ft.
M. E. Trapp et al's No. 1 A. N. Neeley, center of 1.75-ac. tract out of Lion Oil & Ref. Co.'s J. R. Williams lease, P. McAnnally Sur. ....Drlg. 2,555 ft.
Valentine Oil Co.'s No. 1 Goyne-Hughey, 6,100 ft. from S and 6,800 ft. from W of survey, Mary Van Winkle Sur. ....Rigging up.
Waggoner and McCowneil's No. 1 A. J. Green, 25 ft. from NW cor. of Blk. No. 81, M. Dillard Sur. ....Derrick.
Westheimer and Doby's No. 1 J. T. Florence, 606.3 ft. from S line and 123 ft. from W line and 474 ft. from E line of lease, Mary Van Winkle Sur. ....Derrick.
Wiseman et al's No. 1 C. Jones, center of 45-ac. tract, G. W. Hooper Sur. ....Derrick.
H. E. Wrenn's No. 1 A. A. King, 150 ft. from S and E lines of 79-ac. lease, W. P. Chisum Sur. ....Location.

HILL COUNTY

Sherman-Houseman's No. 1 J. F. Griffith, in Samuel Waddell Sur. ....Fishing 3,256 ft.

HOPKINS COUNTY

E. L. Chapman's No. 1 J. D. Jumper, 175 ft. from N line, 285 ft. from W line of lease, Jas. Webb Sur.. S.D. 230 ft.
Roark et al's No. 1 Taylor, 220 ft. from N and W lines of 80-ac. tract in the John Polk Sur. .... S.D. 540 ft.

HOUSTON COUNTY

Ramsland and Ramsland's No. 1 Pennington, 750 varas W of E line and 500 varas from S line of survey on 186-ac. tract, Ramond LaGarza Sur. ....Drlg. 2,210 ft.
C. T. McManus' No. 1 Harron, 300 ft. out of NE cor. of 327-ac. tract, J. P. Procella Sur. ....Spudded and S.D. 37 ft.

HUNT COUNTY

Branson et al's No. 1 Gray ....Location.
Russell et al's No. 1 Brooks and Quattlebaum ....S.D. 1,455 ft.

KAUFMAN COUNTY

Standy Darnell et al's No. 1 Sally Pannill ....T.D. 1,500 ft.

LAMAR COUNTY

G. W. Davy et al's No. 1 McGustion, 450 ft. from S line, 450 ft. from W. line of farm and survey, Galet Wood Sur. ....S.D. 2,880 ft.
Doyle and Jondeau's No. 1 Martin, 990 ft. from N line and 330 ft. from E line of tract, Joseph Deck Sur. ....Rig up.
Doyle and Jondeau's No. 1 Horn, 226 ft. from S line and 608 ft. from E line of lease, R. P. Mayor Sur. ....Drlg. 2,000 ft.
Optometrist Oil Club's No. 1 J. M. McFadden, 450 ft. from S and W lines of McFadden E 25-ac. tract, J. Deck Sur. ....Temp. abnd. 2,506 ft.

LEON COUNTY

Saizer Drlg. Co.'s No. 1 Dr. J. M. Blair, 1,010 ft. from N line, 1,986 ft. from W line, Sec. 19, Blk. E, Lucia Hibbard Sur. ....Derrick on ground.

NACOGDOCHES COUNTY

Adams et al's No. 1 Fuller Brothers, located in a 259-ac. tract, Jose Flores Sur. .... Location.
Gainer et al's No. 1 Nice Well, 18 miles SE of Nacogdoches, 600 ft. from S and 150 ft. from W of Wells tract in A. Cherino Sur. .... S.D. 3,430 ft.
Joiner and Henson's No. 1 Andy Legg, 330 ft. from N and 330 ft. from W of tract, John Durst Sur. ....S.D. 3,920 ft.
Scully & Harwell's No. 1 R. I. Driver, 1,500 ft. from SE cor. of P. B. Ballard 125-ac. tract, 15 miles SE of Nacogdoches in Patricia De Torres Sur. ....S.D. 3,808 ft.
Taylor-Vaughn's No. 1 Dixon Greer, 160 ft. from W and 400 ft. from N lines of 60-ac. tract in the M. G. Horrera Sur. ....S.D. 265 ft.
Creighton Drlg. Co.'s No. 1 J. N. Stewart, center of 79-ac. tract in the Jose Ignacio Y. Barbo Sur. ....S.D. 3,226 ft.

POLK COUNTY

Humble Oil & Refining Co.'s No. 2-A West Texas Lumber Co., 1,902 ft. S and 70 deg. W along property line from N cor. of survey, thence 100 ft. SW of right of way, M. Chavence Sur. .... Drlg. 877 ft.
Sunshine Oil Co.'s No. 1 Brawley, 150 ft. from S line and 250 ft. from E line of W 100 acres of lease, F. Johnson Sur. ....Derrick.

RAINS COUNTY

C. H. Bayliss' No. 1 Ownby, 150 ft. N and 1,100 ft. from E of most easterly SE cor. of survey, Alexander Sur. ....S.D. 4,036 ft.
Greer et al's No. 1 Roy Harper, 150 ft. from S line and E line of tract, 4 miles N of Ginger, David Rose Sur. ....Moving in rig.

RED RIVER COUNTY

Gibbs et al's No. 1 Mace (old well being drilled deeper), 1,200 varas from S line, 1,500 varas from E line of survey, Wm. Cullam Sur. ....S.D. 3,520 ft.
Hoffman and Henson's No. 1 H. H. Lennox, 2,790 ft. W. and 300 ft. S of most easterly NE cor. of survey, J. E. Edmondson Sur. ....S.D. 60 ft.
Concord Oil Co.'s No. 1 J. R. Dellahunty, 500 ft. from N of Isaac Moore Sur. and 200 ft. E of E line of Robert Glass Sur. ....S.D. 2,530 ft.
L. G. Priest's No. 1 J. M. Stiles, 900 varas S and 500 varas E most northerly NE cor. of Jones Bankston Sur. in the Levi Dean Sur. ....S.D. 1,770 ft.

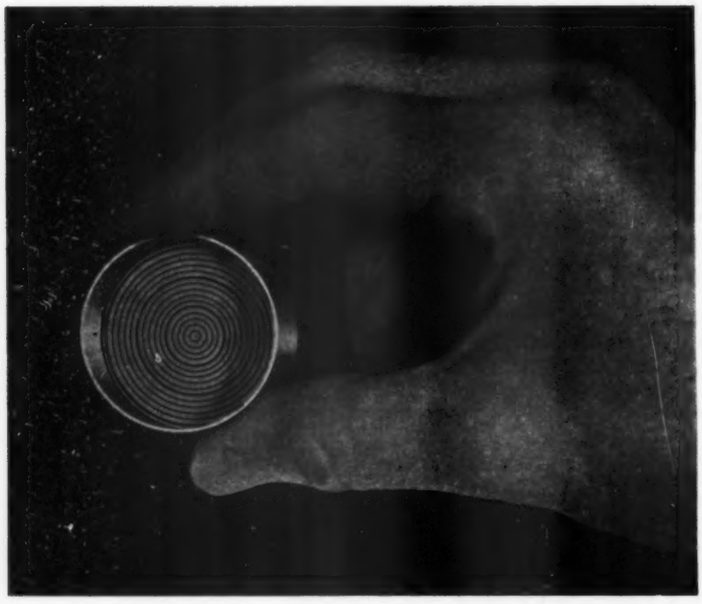
ROCKWALL COUNTY

Bucanner Oil Co.'s No. 1 H. L. Lofland, center of 69-ac. tract in W. M. Bird Sur. ....Set 10-in. csg. 120 ft.

RUSK COUNTY

Brooks Petroleum Co.'s No. 1 J. M. Mayfield, 330 ft. from N line and 150 ft. from W line of 22-ac. lease, D. Clark Sur. ....Drlg. 135 ft.
Butler and Calhoun's No. 1 C. C. Lowe, 225 ft. from N line and 200 ft. from E line of 85-ac. lease, W. G. Tutt Sur. ....Derrick.
Byrd-Frost's No. 1 Buckner, J. E. Peyton Sur. ....Drlg. 3,264 ft.
Cordova Union Oil & Gas Co.'s No. 1 C. O. Christian, 330 ft. from S and E lines of 40-ac. lease, W. A. Elliott Sur. ....Derrick.
C. A. Everts' No. 1 Cole, 210 ft. from N line and 330 ft. from E line of 50-ac. lease, D. Shaw Sur. ..Drlg. 1,519 ft.
E. P. Florey's No. 1 E. B. Alford, center of 3-ac. lease, Isaac Parker Sur. ....Derrick.
E. E. Fogelson's No. 1 D. Wadley, center of 15-ac. tract, D. Clark Sur. ....Derrick.
P. T. Fullwood's No. 1 W. N. Brightwell, 275 ft. E of Horse Shoe Syndicate's No. 1 Brightwell, R. E. Winn Sur. ....S.D. 3,622 ft.
Great Eastern Oil Co.'s No. 1 C. O. Christian, 150 ft. from N line and 330 ft. from E line of lease, J. S. Whiteman Sur. ....Drlg. 1,840 ft.
Gulf Production Co.'s No. 1 W. O. Alford, 330 ft. from E line and 330 ft. from SW line of 140-ac. tract, M. Hussner Sur. ....T.D. 3,721 ft.
Gulf Production Co.'s No. 1 A. H. Rayford, 301 ft. from N line and 330 ft. from E line of 59.87-ac. lease, F. Cordova Sur. ....Rig up.
Hale and Hatchfield's No. 1 C. J. Goforth, 625 ft. from S line and 450 ft. from W line of 13.4-ac. tract, M. J. Pru Sur. ....Rig up and S.D.
Harris and Russell's No. 1 T. W. Harris, 330 ft. from S line and 660 ft. from W line of most southerly SW cor. of 160-ac. tract, 3 miles SW of Henderson, W. G. Davis Sur. ....Derrick.
Hathaway et al's No. 1 Gray, J. M. McLain Sur. ....Drlg. 3,400 ft.
Heiden-Rodgerson et al's No. 1 Barton and Birdwell, N offset to Reisinger et al's No. 1 Barton, W. G. Tutt Sur. ....S.D. 100 ft.
H. E. Hiden's No. 1 Varney, 100 ft. from N line, 125 ft. from E line of road, W. G. Tutt Sur. ....Derrick.
Holland et al's No. 1 S. E. Brox, 330 ft. from N line and 250 ft. from W line of 20-ac. lease, Thomas Grey Sur. ....Derrick.
Howell's No. 1 Irion and Motley, 200 ft. from N line, 1,270 ft. from W line of survey, J. Lindley Sur.....Drlg. 2,920 ft.
Hudspeth's No. 1 E. B. Alford, center of Lot No. 35, T. J. Moore Sur. ....Derrick.
Humble Oil & Refining Co.'s No. 1 W. D. Peterson, 330 ft. from N and W lines of 100-ac. lease and tract, J. Lewis Sur. ....Drlg. 3,502 ft.
T. F. Hunter's No. 1 J. Johnson, 330 ft. from E line and 171 ft. from N line of 13-ac. lease, H. B. Dance Sur. ....Drlg. 2,990 ft.
LaSalle-Davenport and Bledsoe's No. 1 Church, 175 ft. S and 175 ft. E of SE cor. of Sun-Schuler joint lease, J. B. DeCadena Sur. ....Moving in materis .
Moss and Urschel's No. 1 H. L. Griffin, 200 ft. from N line and 150 ft. from W line of 20-ac. lease, Juan Ximenes Sur. ....T.D. 3,697 ft.
Mid-Kansas Oil & Gas Co.'s No. 1 Jim Lunsford, 460 ft. from S line and 330 ft. from W line of 66.6-ac. lease, J. B. DeCadena Sur. ....Spudded.
Mid-Kansas Oil & Gas Co.'s No. 1 George W. Moore, 425 ft. from N line and 330 ft. from S line and 1,105 ft. from E line of 85-ac. tract, W. J. Roan Sur. ....Derrick.
Mid-Kansas Oil & Gas Co.'s No. 1 H. C. Burton, 1,375 ft. from S line and 330 ft. from E line of 59.5-ac. lease, W. D. Porter Sur. ....Drlg. plug.
Mrs. J. A. McIntyre's No. 1 G. A. Dickerson, 330 ft. from N and W lines of 55-ac. lease, T. J. Martin Sur. ....Rig up.
Geo. L. Pace's No. 1 E. B. Alford, center of 5-ac. lease, T. J. Moore Sur. ....Drlg. 3,395 ft.
Pace Petroleum Co.'s No. 1 Wells, W offset to East Texas, W. P. Chisum Sur. ....Derrick.
Pansy Oil Co.'s No. 1 E. B. Alford, center of Blk. No. 50, T. J. Moore Sur. ....Bldg. derrick.
Rajo Oil Corp.'s No. 1 I.&G.N.R.R., approximately half-way between Gulf's Nos. 2 and 5-A Laird, I. Ruddle Sur. ....S. D. 1,400 ft.
Ross Seward's No. 1 Burton, J. J. Y'Barbo Sur. ....S.D. 3,077 ft.
Sabins et al's No. 1 J. R. Irion, 330 ft. from S and E line of 2-ac. tract, John Womack Sur. ....Derrick.
R. E. L. Silvey's No. 1 P. G. Warren, 155 ft. from S line and 96 ft. from E line of 44-ac. tract, John Womack Sur. ....Derrick.
Jay Simmons' No. 1 D. C. Joyner, 2,050 ft. from S line and 300 ft. from W line of 74.11-ac. tract, F. Cordova Sur. ....Derrick.

DRIFTMETER *Junior*



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Sinclair Oil & Gas Co.'s No. 1 J. W. Ashby, 300 ft. from S and W lines of 54.77-ac. lease, William Clark Sur. ..... Derrick.
Sinclair Oil & Gas Co.'s No. 1 D. Ledbetter, 330 ft. from N and E lines of 191-ac. tract, T. M. White Sur. ..... Moving in material.
Skelly et al's No. 1 L&G.N., 1,230 ft. from E line and 660 ft. from S line of survey, J. S. Carrithers Sur. .. Waiting on cmt. to set 3,555 ft.
Spansco Oil Co.'s No. 1 J. R. Alford, center of Lot No. 33, T. J. Moore Sur. ..... Moving in rig.
Stanolind Oil & Gas Co. and Pure Oil Co.'s No. 1 W. H. Siler, 330 ft. from N and W lines of 231.8-ac. tract, T. M. White Sur. ..... Top sand; set csg.; T.D. 3,577 ft.
Weaver-Crim Corp.'s No. 1 M. E. Peterson, 330 ft. from S line and center of E and W line of lease, W. P. Chisum Sur. ..... Rigging up.
Weaver-Crim's No. 1 F. Bean, 175 ft. from NW line and 312 ft. from S line of 16-ac. lease, Mary Cogswell Sur. ..... Derrick.
G. C. Wood's No. 1 J. B. Irwin, 154 ft. from N line and 108 ft. from W line of 35.41-ac. lease, J. Lindley Sur. ..... T.D. 3,820 ft.
Woodruff et al's No. 1 E. B. Alford, center of Lot No. 58 on a 9-ac. lease, T. J. Moore Sur. ..... Waiting on cmt. to set; T.D. 175 ft.

JOINER POOL—RUSK COUNTY

Armstrong's No. 1 Alford, 151 ft. from S and 1,080 ft. from W of survey, T. J. Moore Sur. ..... Rigging up.
Paulett et al's No. 1 Ed Sparks, 350 ft. from E, 150 ft. from S of survey, L. C. Riggs Sur. ..... S.D. 1,465 ft.

SAN AUGUSTINE COUNTY

A. H. Jones and Tennant's No. 1 A. P. Davis ..... Drlg. 2,712 ft.
Smith and Baker's No. 1 Pickering Lbr. Co., 6 miles N of San Augustine, E. Quick Sur. ..... Derrick.

SMITH COUNTY

Acme Oil Co.'s No. 1 Horton, 330 ft. from N and W lines of tract, Mar Sewell Sur. ..... S.D. 2,075 ft.
Alexander and Sartin's No. 1 Sartin, 665 ft. N and 328 ft. W of SW cor. of Mayfield 94-ac. tract, James Jordan Sur. ..... Location.
British-American's No. 1 M. L. Thompson, 320 ft. from N and W lines of 64.52-ac. lease, Isaac Moore Sur... Derrick.
Deaner and Reynolds' No. 1 J. B. Wilson, 330 ft. from S and W lines of 20-ac. lease, James Jordan Sur..... Location.
Hasmussen et al's No. 1 S. S. Cooke, 723 ft. E and 554 ft. S of SW cor. of Mayfield 99-ac. tract, Juan Vargus Sur. ..... Rigging up.
Hamp Florence's No. 1 S. S. Cooke, 150 ft. from S and E lines of 20-ac. lease, Juan Vargus Sur. ..... Drlg. 250 ft.
Hawkins and Sutton's No. 1 Church, 345 ft. from S line and center of E and W lines of 8.73-ac. lease, James Jordan Sur. ..... Rig up.
Iowan-Payne Oil Co.'s No. 1 J. B. Wilson, 330 ft. from S and E line of 25-ac. lease, Juan Vargus Sur. .... Drlg. 3,285 ft.
J. E. Lucas' No. 1 L. S. Sartin, 214 ft. from S line and 330 ft. from E line of 10-ac. lease and 76-ac. tract, James Jordan Sur. ..... Moving in rig.

TITUS COUNTY

Perry V. Cook's No. 1 M. C. Rogers, center of SW of Moore Sur. ..... S.D. 3,770 ft.
Joiner et al's No. 1 Clayton Brown, 1,300 ft. from E and 400 ft. from most northerly S line of V. Evans Sur.. Drill stem test; flowed salt wtr.

UPSHUR COUNTY

L. G. Bradstreet et al's No. 1 O. M. Victory, 330 ft. from N and E lines of 10-ac. lease, E. A. J. Evans Sur. ..... Location.
Clarston et al's No. 1 Eva O'Byrne, 250 ft. from N line and 200 ft. from E line of E 17 acres of 32.17-ac. tract, S. Harwell Sur. ..... Set csg.; T.D. 3,634 ft.
E. & D. Oil Co.'s No. 1 Thomas Wells, 443 ft. W and 250 ft. S of SW cor. of Humble's C. T. Shelton lease, G. W. Hooper Sur. ..... Waiting on cmt. to set 118 ft.
Eslick et al's No. 1 H. F. Whitehurst, 330 ft. out of SW cor. of 5.80 acres of W 40 acres of Whitehurst 100-ac. tract ..... Top Austin chalk 3,616 ft.; base Austin chalk 3,650 ft.; flowed over derrick on 20-minute drill stem test; T.D. 3,701 ft.
Pat Hudson et al's No. 1 D. F. Smith, 330 ft. out of SE cor. of W 100 acres of the N 200 acres of the 272-ac. lease, 3 miles E and 1½ miles N of Cranfill & Reynolds' No. 1 Rash, John Denson Sur. .... Derrick.
J. C. McFarland et al's No. 1 Willie Starr, center of S 40 acres of Starr 96-ac. tract, Charles Cooper Sur. ..... Spudding.
Saturn Oil Co.'s No. 1 W. F. Smith, 330 ft. from E line and center of N and S lines of S 25 acres of W 50 acres of 100-ac. tract, J. Pineda Sur. ..... Testing 3,716 ft.
L. E. Trout et al's No. 1 O. M. Victory, 330 ft. from S and E lines of 40-ac. lease, E. A. J. Evans Sur. ... Derrick.
Wadley and Evans' No. 1 Oliver, 330 ft. out of NE cor. of the W half of survey on a 160-ac. tract, S. Saunders Sur. ..... Spudding.
Webster's No. 1 R. H. McClelland, 1,956 ft. E and 385 ft. S of NW cor. of 751-ac. tract, M. P. Del Torres Sur. ..... Derrick.

VAN ZANDT COUNTY

Barton et al's No. 1 C. L. Hubbard, 600 ft. out of NE cor. of Hubbard 225-ac. tract, 3½ miles S of Canton, M. J. DeCadena Sur. ..... S.D. 2,104 ft.
Humble Oil & Refining Co.'s No. 1 J. F. McPherson, 308 ft. E of W line and 200 ft. N of S line of lease, William Daniel Sur. ..... Drlg. 2,320 ft.
Kelly O. & G. Co.'s No. 1 Lemsford, center of Lemsford tract, John Conner Sur. ..... S.D. 2,300 ft.
Pure Oil Co.'s No. 3 J. H. Leonard, 1,230 ft. from N line and 200 ft. from W of E line of lease, Mund Gross Sur. ..... Drlg. 2,633 ft.
Pure Oil Co.'s No. 9 A. R. Tunnell, 644 ft. N of S line and 250 ft. W of E line of lease, John Walling Sur. ..... Derrick.
Pure Oil Co.'s No. 10 F. B. Smith, 300 ft. E of well No. 9 and 150 ft. N of S line, John Walling Sur. .... Cmt. setting 2,660 ft.
Pure Oil Co.'s No. 2 B. W. Russell, 150 ft. W and 150 ft. S of NE cor. of 81.5-ac. tract, David Rose Sur. ..... Fishing for drill pipe 2,830 ft.
Priest et al's No. 1 B. G. Beckham, 150 ft. from S line, 33 ft. from W line of 100-ac. tract, A. S. Johnson Sur. Drlg. 5,765 ft.
Pure Oil Co.'s No. 2 Mrs. C. White, 250 ft. E of W line, 250 ft. S of N line, John Walling Sur. ..... Derrick.
Pure Oil Co.'s No. 3, 225 ft. S of N line and 225 ft. W of E line, J. Stephenson Sur. ..... Coring 2,930 ft.
Pure Oil Co.'s No. 2 A. R. Humphreys, 200 ft. S of N line and 225 ft. E of W line of lease, A. McPhail Sur. ..... Swabbing 2,989 ft.
Pure Oil Co.'s No. 7 N. E. Clark, 600 ft. S of N line and 225 ft. E of W line of lease in J. Prado Sur. .... Drlg. 800 ft.
Thomasson et al's No. 1 Mrs. W. M. Corley, 259 ft. from S line and 164 ft. from W line of 63-ac. tract, F. Montgomery Sur., 7 miles S of Canton ..... Drlg. 2,765 ft.
Thomasson, Inc.'s No. 2 W. P. Forster, 600 ft. from N and 450 ft. from E of SW cor. of Forster 151-ac. tract in the F. Montgomery Sur. ..... S.D. 3,200 ft.
Van Oil Association's No. 1 Tankersley, 200 ft. from E and 1,000 ft. from S of farm, L. Landers Sur. ..... S.D. 2,850 ft.

WOOD COUNTY

Talko Oil Co.'s No. 1 G. T. Ross, B. L. Smith Sur..... Drlg. 1,820 ft.
Wood County Dev. Co.'s No. 1 Davis, approximately 180 ft. from S line of 160-ac. tract and 2½ miles S of Kantes in Sarah McDonald Sur. ..... Moving in rig.

WILDCAT OPERATIONS IN WEST TEXAS

(Continued from Page 26)

GARZA COUNTY

Penny & Posey's No. 1 Justice, 1,980 ft. from S and 1,680 ft. from E of Sec. 25, Blk. 6, H.&G.N. Sur. (3,500-ft. cable tool test) ..... T.D. 3,320 ft.; to run 6⅝-in. csg.

HOWARD COUNTY

American-Maracaibo's No. 5-A Settles, 1,896 ft. from N, 1,884 ft. from W, Sec. 6, Blk. 32, T.&P. Sur. ..... Bldg. rig.
Chalk's No. 1 fee, 330 ft. from S and E Sec. 96, Blk. 29, W.&N.W. Sur. ..... Drlg. 925 ft.
F. H. E. Oil Co.'s No. 1 Denman, 330 ft. from N, 2,310 ft. from E of Sec. 14, Blk. 30, T.&P. Sur. ..... Location.
Green O. & R. Co.'s No. 1 Denman, 990 ft. from S and 2,310 ft. from W, Sec. 14, Blk. 30, Twp. 1s, T.&P. Sur.. Spudded and S.D.
Wallace et al's No. 1 Bell, 1,960 ft. from N, 2,640 ft. from W, Sec. 12, Blk. 30-1s, T.&P. Sur. ..... Rigging up cable tools.

IRION COUNTY

Apollo Oil Co.'s No. 4 Nutt, 504 ft. from N and 1,562 ft. from W of Subd. No. 6, Gonzales County School Land ..... Cellar.
Davis et al's No. 1 Suggs, 1,560 ft. from S and 925 ft. from W, Sec. 3,081, Blk. 28, H.&T.C. Sur. ..... Drlg. 6,845 ft.; show oil 6,089, 6,707 and 6,813 ft.
Stanolind Oil & Gas Co.'s No. 1 Williams, 1,320 ft. from S and E of Sec. 1,196, T.T.R.R. Sur. ..... Rig burned; T.D. 7,425 ft.
Straughn & Adkins Bros.' No. 1 Lee, 1,080 ft. from W and 420 ft. from N of Sec. 729, C. Kaiser Sur..... T.D. 1,505 ft.; to plug.

JONES COUNTY

Johnson's No. 1 Huddleston, 165 ft. from S and W of N half of N half of Sec. 39, Blk. 18, T.&P. Sur..... Rig.
Grove & Shield's No. 1 Toomis, 1,140 ft. from N and 220 ft. from E Sec. 25, Blk. 19, T.&P. Sur. ..... Location.
Young et al's No. 1 Harrell, 150 ft. from S and E of N half of Sec. 8, O.A.L. Sur. ..... Location.
Abers et al's No. 1 Burton, 150 ft. from S and 175 ft. from E of 43.4-acre tract in G. Martinez Sur..... S.D. 1,005 ft.; temp. abnd.
Transcontinental Prod. Co.'s No. 1 Rust, 5,800 ft. N and 995 ft. W of SE cor. J. J. Hughes Sur. 556 ..... Cellar.

LOVING COUNTY

Wm. Little's No. 1 Hugo Freels, 1,923 ft. from NE lines and 410 ft. from NW lines of Sec. 92, W.&N.W. Sur., Blk. 1 ..... Drlg. 1,820 ft.
Covey et al's No. 1 Wheat, 2,310 ft. from SW, 330 ft. from SE, Sec. 3, Blk. 2, W.&N.W. Sur. ..... Location.
Eppenauer Drlg. Co.'s No. 1 Allen, 465 ft. from NE and SE, Sec. 4, Blk. 2, W.&N.W. Sur. ..... S.D. 200 ft.
Ervin & Mahres' No. 1 Thrope, 2,310 ft. from E and 330 ft. from S, Sec. 46, Blk. 53, T.&P. Sur. ..... S.D. 2,500 ft.
Slack's No. 1 Lynd, 990 ft. NE and 330 ft. SE of Sec. 3, Blk. 2, W.&N.W. Sur. ..... T.D. 4,265 ft.; flows 60 bbls. every other day; cleaning out.
Falbre & Evans' No. 1 Dean, 330 ft. from NE and 990 ft. from NW, Sec. 79, Blk. 33, H.&T.C. Sur..... Drlg. 3,155 ft.
Lewis & Siagel's No. 1 Johnson, 330 ft. from N and 1,650 ft. from W, Sec. 6, Blk. 56, Twp. 1, T.&P. Sur... T.D. 800 ft.; straightening crooked hole.
Lockhart & Co.'s No. 3 Bowen & Wells, 330 ft. from NE and SE of Sec. 92, Blk. 1, W.&N.W. Sur..... S.D. 3,385 ft.
Miller et al's No. 1 Ferguson, 990 ft. from N and E of Sec. 44, Blk. 29 ..... Spudded.
Phillips Pet. Co.'s No. 3 Wheat, 330 ft. from SW and 2,310 ft. from SE, Sec. 35, Blk. 1, W.&N.W. Sur..... Drlg. 4,270 ft.
Stein & Bowers' No. 1 Jim Wheat, 1,650 ft. from NW and 1,650 ft. from NE lines of Sec. 83, W.&N.W. Sur., Blk. 1 ..... Location.
Tennant et al's No. 1 Martin, 990 ft. from NW and SW, Sec. 66, Blk. 1, W.&N.W. Sur. ..... S.D. 4,380 ft.; to run csg.

MENARD COUNTY

Priest's No. 1 Sorrel, 1,000 ft. from E and 200 ft. from S cor., Sec. 132, E.L.R.R. Sur. ..... S.D. 2,860 ft.

PECOS COUNTY

Anderson's No. 1 Lee Fever, 330 ft. from N and W of Sec. 78, Blk. 8, H.&G.N. Sur. ..... S. D. 2,037 ft.
Black et al's No. 1 Pecos Valley, 1,037 ft. from SE, 433 ft. from SW, Sec. 36, Blk. 3, H.&T.C. Sur. ..... Drlg. 955 ft.
Cardinal Oil Co.'s No. 1 J. H. Tippett ("J"), 1,980 ft. from the S line and 990 ft. from the W line of Sec. 2, D. F. Robertson Sur. ..... S.D. 675 ft.; plugged back to 600 ft.
Corvette Oil Corp.'s No. 8 H. Monroe, 1,040 ft. from E line and 150 ft. from N line of Sec. 39, G.C.&S.F. Sur., Blk. 194 ..... Location.
Culberson Bros.' No. 4 Tippett, 150 ft. from N and 1,335 ft. from W of SE Sec. 40, Blk. 194, G.C.&S.F. Sur. ... Location.
Hampton et al's No. 1 Byrne, 1,980 ft. from NW and 1,500 ft. from NE Sec. 54, Blk. 10, H.&G.N. Sur. .... T.D. 785 ft.; to run 8¼-in. csg.
Dittman's No. 1 Sanford, 330 ft. from NW and 1,650 ft. from NE of Sec. 55, Blk. 10, H.&G.N. Sur..... Drlg. 1,425 ft.

PRESIDIO COUNTY

Sadler et al's No. 1 Biedsoe, 2,640 ft. from N and W Sec. 15, Blk. 354, G.C.&S.F. Sur. ..... Bldg. rig.

REAGAN COUNTY

Big Lake Oil Co.'s No. 6-C University, 1,370 ft. from S and 1,000 ft. from E, Sec. 12, Blk. 2 ..... Drlg. 5,215 ft.

REEVES COUNTY

Cunningham et al's No. 1 Wright, 1,320 ft. from S and W, Sec. 58, Cassel's Sur. ..... S.D. 75 ft.
F. McDorman et al's No. 1 Ray Roberts et al, 2,310 ft. from S and E lines of Sec. 22, Blk. 59, P.S.L. Sur.... S.D. 105 ft.
James & Milton's No. 1 Patterson, 330 ft. from N and W of Sec. 21, Blk. 72 ..... S.D. 3,360 ft.
Lee O. White et al's No. 1 Hershercon, 330 ft. from N and W lines of Sec. 5, Blk. 61, Twp. 10, T.&P. Sur.... S.D. 5,044 ft.

RUNNELS COUNTY

Blue Bonnett Oil Co.'s No. 1 McMillan, 1,368 ft. from N and 660 ft. from W Sec. 22, N. Travis Sur. ..... Material.
Dutton et al's No. 1 Dean, 5,475 ft. from NE and 1,048 ft. from NW in J. Heil Sur. No. 519 ..... S.O. 3,427-20 ft.; S.D. 3,600 ft.

SCHLEICHER COUNTY

Eastland Oil Co.'s No. 1 Joe Tisdale, C, Sec. 29, Blk. M, G.H.&S.A. Sur. ..... S.D. 5,165 ft.
Wesner et al's No. 1 Nicks, 2,310 ft. from N and 2,302 ft. from E of Sec. 77, Blk. LL, T. C. Sur. ..... S.D. 5,580 ft.
George Wilson's No. 1 Page, Sec. 40, Blk. L, 1,290 ft. from N, 1,570 ft. from W, G.H.&S.A. Sur. ..... S.D. 5,052 ft.

SCURRY COUNTY

G. E. Dickman and R. B. Pender et al's No. 1 F. C. Davis, 1,000 ft. N and 1,770 ft. W of SE cor. of Sec. 275, Blk. 2, H.&T.C. Sur. ..... S.D. 5,050 ft.
Scurry County Oil Exchange's No. 1 Earnest, 2,310 ft. from N and W, Sec. 68, Blk. 3, H.&G.N. Sur. ..... Spudded and S.D.
Seifert & Dibble's No. 1 T. M. Blackburn, 2,310 ft. from N and 2,310 ft. from W line of Sec. 153, Blk. 97, H.&T.C. Sur. ..... Fishing 4,100 ft.; show gas 3,995 ft.

TERRELL COUNTY

Big Bend Oil Co.'s No. 1 Bassett, C NW, Sec. 155, Blk. D, M-K-T Sur. ..... S.D. 2,269 ft.
Keck Pecos Trust Co.'s No. 1 Hamilton, C, Sec. 6, Georgetown Ry. Sur. ..... S. D. 3,150 ft.; moved off tools.
Miller Bros.' No. 1 Allison & Burke, C NW, Sec. 10, Blk. 176, T.&P. Sur. ..... S.D. 120 ft.
Mid-Kansas Oil & Gas Co.'s No. 1 Goode, 2,152 ft. from E and 330 ft. from S, Sec. 26, Blk. 161, G.C.&S.F. Sur. S.D. 6,120 ft.

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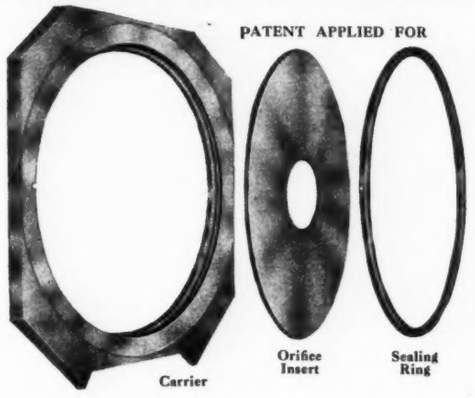

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Jones et al's No. 1 Pankenham, C SE NW, Sec. 42, Blk. B-2, C.C.S.D.&R.G.N.G. Sur. ..... S.D. 2,545 ft.
Sides et al's No. 1 Phelps, 2,157 ft. from N and 2,482 ft. from W, Sec. 5, G. W. Hurley Sur. ..... S.D. 855 ft.

TOM GREEN COUNTY

Andrews' No. 1 Pugh, 250 ft. from N and 5,184 ft. from E, James Eldridge Sur. No. 73 ..... S.D. 453 ft.
Belding & Dutton's No. 1 Norsworthy, 1,640 ft. from S and 587 ft. from E of John McNeese Sur. ..... S.D. 760 ft.; S.O. and gas 725 ft.
Mintex Oil Co.'s No. 1 Campbell Est., 446 ft. from S and 630 ft. from W of Sec. 180, Dist. No. 11, S.P. Sur. ..... S.D. 1,994 ft.
Pratt & Hancock's No. 3 Lewis, 100 ft. N and 330 ft. E of most northerly SW cor. of Joshua S. Grant Sur. No. 2 ..... S.D. 200 ft.

UPTON COUNTY

Farley et al's No. 1-B Lone, 2,310 ft. from N and E, Sec. 36, Blk. 1, M.K.&T. Sur. ..... Location.

VAL VERDE COUNTY

Couch et al's No. 1 J. P. Yoas, 1,300 ft. from the N line and E line of Sec. 31, Blk. 1, I.&G.N. Sur. ..... S.D. 220 ft.
Independent Operators' No. 1 Whitehead, SE SE, Sec. 10, Blk. 4, I.&G.N. Sur., elev. 1,175 ft. ..... S.D. 5,360 ft.
O. O. Owens' No. 1 Mills, Sec. 128, Blk. 1, I.&G.N. Sur., elev. 2,130 ft. ..... S.D. 6,780 ft.

WARD COUNTY

Abell Bros.' No. 1 Sloan, 330 ft. from NW and NE, Sec. 34, Blk. 5, H.&T.C. Sur. ..... T.D. 2,430 ft.
Abell Bros. et al's No. 1 Smith, 330 ft. from NE and NW, Sec. 4, Blk. 34, E.&T.C. Sur. ..... Location.
Bradford & Bentley's No. 1 B. Carson, 1,650 ft. from the NE line and 990 ft. from the SE line of Sec. 26, H.&T.C. Sur., Blk. 5 ..... National machine.
Buck Sturm et al's No. 2 R. H. Gill, 2,310 ft. from SW line and 330 ft. from SE line, Sec. 25, Blk. B-29, P.S.L. Sur. ..... T.P. 2,473 ft.; S.D. 2,488 ft.; making 30 bbls. per day.
Eppenauer's No. 1 Purcell, 365 ft. from SW and 1,650 ft. from SE of Sec. 17, Blk. 34, H.&T.C. Sur. ..... S.D. 2,740 ft.; estm. 25-bbl. well.
Eppenauer Drlg. Co.'s No. 1 Townsend-Moore, 990 ft. from SE and 330 ft. from SW Sec. 17, Blk. 34, H.&T.C. Sur. ..... Spudded and S.D.
H. V. Greer's No. 1 Carr, 150 ft. from NW and 510 ft. from SW, Sec. 12, Blk. 5, H.&T.C. Sur. ..... Drlg. 1,750 ft.
Gulf Prod. Co.'s No. 10 Hutchings, 330 ft. from N and W of 5,370 acres, Sec. 5, Blk. F, G.M.M.B.&A. Sur. ..... Drlg. 1,465 ft.
Gulf Prod. Co.'s No. 21 O'Brien, 2,557 ft. from N, 330 ft. from E of Sec. 16, Blk. F ..... Rigging up.
Moran & Burkhart's No. 2 J. T. Sweatt et al, 3,810 ft. from SW, Sec. 1, J. Howe Sur. ..... S.D. 821 ft.
Moran & Miles' No. 1 Boogher, 3,603 feet from NE and 1,303 ft. from SE Sec. 11, Blk. 5, H.&T.C. Sur. ..... Drlg. 1,868 ft.
R. F. Owen's No. 1 Lee, 1,344 ft. from NW and 4,532 ft. from SW Sec. 1, J. Howe Sur. ..... T.D. 715 ft.; fishing.
Plains Prod. Co. and Simms Oil Co.'s No. 1 Benton Land Co., 440 ft. from the SE and 440 ft. from SW lines of Sec. 24, W.&N.W.R.R. Sur., Blk. 1 ..... Shut down.
Rector Oil Co.'s No. 1 Smith, 1,320 ft. from N and E, Sec. 22, Blk. A, G.M.M.B.&A. Sur. ..... S.D. 3,602 ft.
Richardson et al's No. 7 O'Brien, 1,900 ft. from N and 330 ft. from W Sec. 5, Blk. F ..... Drlg. 275 ft.
Rixford et al's No. 1 Green, 330 ft. from NW and SW Sec. 4, Blk. 34, H.&T.C. Sur. ..... Rigging up
Sudderth & Carey's No. 1 J. H. Boogher et al, 150 ft. from SW and SE lines of Lot 24, Sec. 11, Blk. 5, H.&T.C. Sur. ..... S.D. 290 ft.
Stanolind Oil & Gas Co.'s No. 1 Cannon, 3,300 ft. from SE and 1,649 ft. from NE, Sec. 29, Blk. B-29 ..... Drlg. 2,410 ft.
T. P. Coal & Oil Co.'s No. 2 James, 330 ft. from NW and NE Sec. 5, Blk. 34 ..... Material.
White et al's No. 1 Burtner, 150 ft. from NE and 515 ft. from SE of Sec. 8, Blk. 32, H.&T.C. Sur. ..... S.D. 755 ft.

WINKLER COUNTY

Liner Drlg. Co.'s No. 1 Campbell, 350 ft. from N and E cor., Sec. 2, Blk. B-5 ..... S.D. 4,640 ft.
Sid Richardson's No. 1 S. M. Halley, 330 ft. from the S line and 1,650 ft. from the E line, Sec. 25, School Blk. B-12 ..... Drlg. 2,950 ft.; show gas and oil 2,810 ft.; 1,600 ft. oil in hole.

WILDCAT OPERATIONS IN TEXAS PANHANDLE

(Continued from Page 26)

Operators Royalty & Prod. Co.'s No. 2 Arnold, 330 ft. from S and W, Sec. 149, Blk. 3, I.&G.N. Sur. ..... Rig.
Pulse-Shell Pet. Corp.'s No. 1 Wright, 330 ft. from S and W of Sec. 13, Blk. 3, I.&G.N. Sur. ..... S.D. 2,659 ft.
Prairie Oil & Gas Co.'s No. 1 Pope, 330 ft. from N and E, Sec. 173, Blk. 3, I.&G.N. Sur. ..... Coring 3,123 ft.
Saunders et al's No. 2 Sullivan, 822 ft. from W and 231 ft. from NE, 160 ft. S, 264 ac. of N½, Sec. 136, Blk. 3, I.&G.N. Sur. ..... Will plug back to 3,275 ft. and shoot.
Skelly Oil Co.'s No. 24 Schaffer, 440 ft. from W, Sec. 172, Blk. 3, I.&G.N. Sur. ..... T.D. 3,256 ft.
Skelly Oil Co.'s No. 25 Schaffer, 330 ft. from S and E, Sec. 189, Blk. 3, I.&G.N. Sur. ..... T.D. 3,062 ft; S.G. 3,062 ft.
Skelly Oil Co.'s No. 26 Schaffer, 330 ft. from S and W, Sec. 173, Blk. 3, I.&G.N. Sur. ..... Drlg. 2,475 ft.
Skelly Oil Co.'s No. 28 H. Schaffer, 440 ft. from S line and 440 ft. from E line of NE Sec. 189, I.&G.N. Sur., Blk. 3 ..... Drlg. 1,070 ft.
Stanolind Oil & Gas Co.'s No. 2 Waggoner, 330 ft. from N and W, Sec. 173, Blk. 3, I.&G.N. Sur. ..... T.D. 2,325 ft; ran 8-in.
Sullivan & Ochiltree's No. 1-A Morse, 330 ft. S and W, N½ NE, Sec. 15, Blk. A-9, H.&G.N. Sur. ..... Fishing 2,880 ft.
Tarber's No. 1 Saunders, 330 ft. N and W, Sec. 3, Blk. 1, B.B.&S.F. Sur. ..... Location.
Travis' No. 3 Back, 330 ft. from S, 2,300 ft. from E, Sec. 44, Blk. 25, H.&G.N. Sur. ..... Location.

HUTCHINSON COUNTY

Baso's No. 1 Moore, 330 ft. from S and 330 ft. from E, in 80 ac. in NW, Sec. 21, Blk. M-21, T.C.R.R. Sur. ..... S.D. 2,220 ft.
Combination O. & G. Co. and Alspaugh's No. 1 Johnson, 330 ft. from S line, 330 ft. from E line of NW SW, Sec. 4, Blk. Y, A.&B. Sur. ..... Drlg. 825 ft.
Danciger O. & R. Co.'s No. 1 Johnson, 330 ft. N and W, SE, Sec. 34, Blk. Y, A.&B. Sur. ..... Spudded and S.D.
Deal O. & G. Co.'s No. 2 Sanford, 330 ft. N and E of N 80 ac., S 160 ac., Sec. 81, Blk. 46, H.&T.C. Sur. ..... S.D. 450 ft.
Huber Prod. Co.'s No. 1 Johnson Bros. (Premier), 330 ft. N and E of W 60 ac., N 80 ac., NW, Sec. 3, Blk. Y, A.&B. Sur. ..... Drlg. 3,120 ft; flowing 10 bbls. per hr.
Liner Drlg. Co.'s No. 1-D Johnson, 330 ft. from N and E, Sec. 6, Blk. 1, B.&B. Sur. ..... Location.
Oates and Marrow's No. 1 W. A. Starnes, C SE SW SE Sec. 24, M-23 T.C.R.R. Sur. ..... Spudded.
Pharis Oil Co.'s No. 5 Smith, 660 ft. from N and W, SW, Sec. 14, Blk. Y, M.&C. Sur. ..... Spudded.
Harry Stekoll's No. 1 Whittenburg, 1,650 ft. from N, 330 ft. from E, Sec. 39, Blk. Z, G.C.&S.F. Sur. ..... T.D. 3,028 ft; shot with 100 qts. 2,980-3,028 ft.
Timms-Deatch's No. 4 Moore, 330 ft. N and W, Sec. 124, Blk. 4, I.&G.N. Sur. ..... Rig.

LIPSCOMB COUNTY

Okla. Public Service Co.'s No. 1 C. W. Jones, NE SW, Sec. 100, H.&T.C. Sur. ..... T.D. 5,003 ft.

MOORE COUNTY

Dogie Oil Co.'s No. 1 Greenwald, 330 ft. from N and W, Sec. 277, Blk. 44, H.&T.C. Sur. ..... Drlg. 50 ft.
Dana O. & G. Co.'s No. 1 Roberson et al, 330 ft. from S and E, Sec. 165, Blk. 3-T, T.&N.O. Sur. ..... Location.
Interstate's No. 1 Nield, C NE, Sec. 18, Blk. 44, H.&T. C. Sur. ..... Rig up.
Magnolia Pet. Co.'s No. 1 Nield, 330 ft. from S and E of N½, Sec. 361, Blk. 44, H.&T.C. Sur. ..... Drlg. 3,055 ft.
Pollard et al's No. 1 Hall, 330 ft. S and E, NE, Sec. 131, Blk. 3-T, T.&N.O. Sur. ..... Rig on ground.
Sunray Oil Co.'s No. 2 Jones, 330 ft. N and W, W½ SW, Sec. 164, Blk. 3-T, T.&N.O. Sur. ..... Rig on ground.
Sunset Oil Co.'s No. 1 R. O. Brumley, 330 ft. from N line and 330 ft. from W line of SW, Sec. 360, H.&T.C. Sur. ..... Drlg. 2,250 ft.
Texas Interstate P. L. Co.'s No. 1-23 Thompson, C N½ NE, Sec. 23, Blk. 44, H.&T.C. Sur. ..... Location.
Texas Interstate P. L. Co.'s No. 1-37 Sneed, C NW, Sec. 37, Blk. 6-T, T.&N.O. Sur. ..... Location.
Texhoma Nat. Gas Co.'s No. 4 Coon "M," C SE, Sec. 103, Blk. 44, H.&T.C. Sur. ..... Drlg. 3,015 ft; 17,600,000 ft. gas

MOTLEY COUNTY

Matador Oil Corp.'s No. 1 Owens, C NE, Sec. 10, Blk. G, B.&B. Sur. ..... S.D. 530 ft.

OLDHAM COUNTY

Amalgamated German-American Oil Corp.'s No. 1 Norton, 330 ft. S and E, Sec. 12, T.&N.O. Sur. ..... S.D. 400 ft.
Chambers et al's No. 1 Herring, CNL, Sec. 20, Blk. 8, G.C.&S.F. Sur. ..... S.D. 3,555 ft.

PARMER COUNTY

Magnolia Pet. Co.'s No. 1 Wilson, 330 ft. from N and W, SE, Sec. 73, H. Kelly Sur. ..... Drlg. 3,925 ft.

ROBERTS COUNTY

Chicken Creek Oil Co.'s No. 1 Ledrick, 330 ft. N and W, Sec. 55, Blk. C, G.&M. Sur. ..... T.D. 3,990 ft.
Travis et al's No. 1 Cunningham, 330 ft. S and W, Sec. 74, Blk. M-2, H.&G.N. Sur. ..... S.D. 2,650 ft.

WHEELER COUNTY

Devore & Robinson's No. 1 Sitter, 2,310 ft. from S and E of E½ of Sec. 33, Blk. 24, H.&G.N. Sur. ..... S.D. 2,193 ft.

SOUTHWEST TEXAS PROVEN AREAS

(Continued from Page 38)

COLE POOL—DUVAL COUNTY

Cole Petroleum Co.'s No. 75 Benavides, 365 ft. from NE line, 150 ft. from NW line, Blk. 8, Sec. 18, Mariana Arispe grant ..... T.D. 3,012 ft.; drilling deeper after testing gas.

GOVERNMENT WELLS—DUVAL COUNTY

Duval Oil Corp.'s No. 8 Bishop Cattle Co., 660 ft. E of No. 1 in Sur. No. 135 ..... T.D. 2,385 comp. 200 bbls.
Humble Oil & Ref. Co.'s No. 3 Paul White, 1,650 ft. from S and W lines of Sur. 58 ..... Spudded in.
Thomas & Tarver, Inc.'s No. 6 Bishop Cattle Co., 600 ft. E of No. 2 ..... T.D. 2,384 ft.; drlg.

S.R.C. POOL—DUVAL COUNTY

S.R.C. Oil Co. and Magnolia Pet. Co.'s No. 7 Duval Land Co. ..... T.D. 1,745 ft.; comp. 250 bbls.

DARST CREEK POOL—GUADALUPE COUNTY

Humble Oil & Ref. Co.'s No. 3-C Denman, 600 ft. NE of No. 2-C Denman, 700 ft. from W line of lease ..... T.D. 2,555 ft.; com. 300 bbls.

SLICK POOL—DEWITT-GOLIAD COUNTIES

Simms et al's No. 1 J. C. Tom ..... T.D. 4,513 ft.; abnd.

RANDADO POOL—JIM HOGG COUNTY

O. W. Killam's No. 1 Hinnant, 150 ft. N of NE cor. of Sur. No. 84 in Sur. No. 614 ..... T.D. 2,245 ft.; abnd.

CHITTIM POOL—MAVERICK COUNTY

Texas Gas Utilities' No. 8 Chittim, 24 ft. S of No. 7 Chittim ..... T.D. 4,850 ft.; standing.

SAXET FIELD—NUECES COUNTY

Gulf Coast Oil Co.'s No. 1 Sagarin ..... T.D. 3,100 ft.; standing.
Gulf Coast Oil Co.'s No. 1 Elder, NW of same company's No. 1 Harrell ..... T.D. 5,070 ft.; standing.
Gulf Coast Oil Co.'s No. 1 Perkins and LeGasse, 330 ft. from N and E lines of 245-ac. tract, Sec. 26, Shepard Subd. ..... Location.
Gulf Coast Oil Co.'s No. 3 Sedwick, east offset to Houston Oil Co.'s No. 1-B Maggie Harrell ..... Making location.
Houston Oil Co.'s No. 1 McGregor, 150 ft. from E line, 330 ft. from S line of 100-ac. tract in Sur. 311 ..... T.D. 4,250 ft.; drlg.
Kepley et al's No. 1 Speer and Hocker, 200 ft. from E and S lines of 850-ac. tract in Speer and Driscoll lands ..... Location.
Neal, Milton & Kepley's No. 2 Roark ..... Making location.
Rutherford Drilling Co.'s No. 1 Hunter, 150 ft. from S and W lines of 10-ac. tract ..... Rigging up.
Saxet Oil Co.'s No. 3 Donigan, north offset to Zoch's No. 1 Baldwin ..... Location.
Saxet Oil Co.'s No. 5 Well, 3,041 ft. to N line, 333 ft. to W line ..... T.D. 2,500 ft.; standing.
Saxet Oil Co.'s No. 6 Dunn, 600 ft. S of No. 5 Dunn, 4 miles W from Corpus Christi ..... T.D. 5,700 ft.; drlg.

ARANSAS POOL—SAN PATRICIO COUNTY

Atlantic Oil Prod. Co., to deepen to 6,000 ft. the Welder Oil Corp.'s No. 3 Welder ..... T.D. 3,689 ft.; to deepen.

LOS OLMOS POOL—STARR COUNTY

Bennett Oil & Gas Co.'s No. 1 Seabury et al, Porcion 75 .. Moving in.
Coastal Oil & Gas Co.'s No. 1 Kelsey-Bass, 448 ft. to N line, 150 ft. to W line of Tract 52, Sur. 2, Porcion 86 .. Location.
Hooks & Weaver's No. 4 Kelsey-Bass, 600 ft. N of their No. 1 Kelsey-Bass ..... T.D. 450 ft.; set csg.
Hooks and Weaver's No. 5 Kelsey-Bass ..... Making location.
Los Olmos Oil & Gas Co.'s No. 11 Kelsey-Bass ..... Spudded in.
J. A. Tarver's No. 1 A. K. Bass, 150 ft. from N and E lines of lease ..... T.D. 465 ft.; drlg.
Jones & Watt's No. 1 Kelsey-Bass, 200 ft. to N and W lines of Sur. 7, Porcions 75, 76 and 77 ..... T.D. 458 ft.; cored sand.
M. A. Landrum's No. 1 A. K. Bass, Sec. 6, 150 ft. to S and E lines of lease ..... Location.
Los Olmos Oil & Gas Co.'s No. 9 Kelsey-Bass, 450 ft. from W line, 150 ft. from N line of SE SW of Sur. No. 6 ..... T.D. 502 ft.; set csg.
Los Olmos Oil & Gas Co.'s No. 10 Kelsey-Bass ..... T.D. 340 ft.; set csg.
Quien Sabe Oil & Gas Co.'s No. 2 Kusch, 150 ft. from N line, 525 ft. from E line of Tract 11 in Porcion 75 .. T.D. 253 ft.; abnd.
Rio Oil & Gas Co.'s No. 1 Kelsey-Bass (formerly carried as Los Olmos Oil & Ref. Co.'s No. 1 Kelsey-Bass) ..... T.D. 910 ft.; standing.
Rio Oil & Gas Co.'s No. 3 Kelsey-Bass, No. 6 Subd., Porcions 75, 76, 77 ..... T.D. 400 ft.; drlg.
San Marcos Oil & Gas Co.'s No. 7 Ivey, 450 ft. S of No. 6 Ivey ..... T.D. 480 ft.; drlg.
E. W. Sullivan's No. 1 Kelsey-Bass, 60 ft. from N and W lines of SE SE SE of Sur. 7 ..... T.D. 610 ft; abnd.

WEST COLE POOL—WEBB COUNTY

French Oil Corp.'s No. 5 Benavides, 1,602 ft. from N line, 150 ft. from W line of Sur. 659 ..... T.D. 2,335 ft.; comp. 75 bbls.

French Oil Corp.'s No. 7 Benavides, 2,310 ft. from N line, 150 ft. from W line of Sur. 659 ..... Location.

ESCOBAS POOL—ZAPATA COUNTY

E. R. Black & Paul S. Williams' No. 1 Comitas grant, 150 ft. from S and E lines of Blk. 100 ..... Location.
F. M. Blair & Son's No. 1 Montemayor, 450 ft. to N, 150 ft. to E line of Blk. No. 1, Sur. No. 63 ..... Spudded in.
Brogan & Belcher's No. 1, M. Garza, 150 ft. to NE and SE lines, Blk. 62, C. A. Douglas Subd. of Zorro ranch, Comitas grant ..... T.D. 2,000 ft.; abnd.
Daniels & Hill's No. 2 Montemayor, 112 ft. from N line, 174 ft. from E line of Blk. 7, Sur. 64 ..... T.D. 1,484 ft.; sand tested, drlg.
K. & M. Oil Co.'s No. 1 Cuellar, 150 ft. from N and W lines of Blk. 7, Sur. 13 ..... T.D. 1,508 ft.; comp., gasser.
D. M. Shaffer's No. 1 M. Garza, 150 ft. from NE and NW lines of Blk. 56, C. A. Douglas Subd. of Zorro ranch ..... Rigging up.
S.R.C. Oil Co.'s No. 6-D Montemayor, 150 ft. from N and W lines of Blk. 10, Sur. 64 ..... T.D. 1,482 ft.; abnd.
S.R.C. Oil Co.'s No. 8-D Montemayor, 150 ft. from S and E lines of Blk. 8, Sur. 64 ..... T.D. 1,484 ft.; abnd.
Trevino Oil Corp.'s No. 1 M. Garza Estate, 150 ft. from NE line, 250 ft. from SE lines of Blk. 36, Douglas Subd., Comitas grant ..... T.D. 1,358 ft; drlg.
Trevino Oil Corp.'s No. 16-A Trevino, 150 ft. from S and E lines of Blk. 14, Sur. 412 ..... Location.
Winch & Billings' No. 9 Bustamente, 1,218 ft. from NE line, 150 ft. from SE line of 31-ac. Pal-Mar tract in Share 35, Fansler's Subd., Comitas grant ..... T.D. 2,167 ft.; plugging back to 1,528 ft.; comp. 50 bbls.
Winch & Billings' No. 10 Jose Benavides, 500 ft. from NE and 170 ft. from SE line of 31-ac. Pal-Mar tract, Share 35, Fansler Partition of Comitas grant ... Location; (number changed).

CHARCO-REDONDO POOL—ZAPATA COUNTY

Bob & Richey's No. 28 Martinez, 990 ft. from SW line, 615 ft. from SE line, Blk. 24, Duke Subd., Charco Redondo grant ..... Location.
Bob & Richey's No. 29 Martinez, 810 ft. from SW line, 360 ft. from SE line of Blk. 24, W. R. Duke Subd., Charco Rendondo grant ..... Location.

MARTINEZ POOL—ZAPATA COUNTY

F. H. Etheridge's No. 3 Winch & Henne, 160 ft. from W line, 200 ft. from S line of Blk. 10, Sur. 286 ..... Spudded in.

WILDCAT OPERATIONS IN SOUTHWEST TEXAS

(Continued from Page 38)

Bridwell et al's No. 1 G. A. White, 550 ft. to E line, 150 ft. to S line of farm, Nancy Roberts Sur., 4 miles SE from Belton ..... T.D. 537 ft.; no report.
W. A. Klecka's No. 1 W. W. Thornton, 500 ft. from N line, 1,058 ft. from E line of tract in R. Roberts Sur. ..... Location.
J. W. Riley's No. 1 W. S. Chaffin, in M. Griffin Sur. ..... T.D. 365 ft.; S.D.
Jas. Scroggins' No. 2 Warrick, Ingram Sur. ..... T.D. 1,432 ft.; S.D.

BEXAR COUNTY

Amsden-Ingersoll-Miller's No. 1 Strumberg, 450 ft. to W line, 1,020 ft. to N line of tract, 12 miles SW of San Antonio ..... T.D. 610 ft.; drlg.
Eckert et al's No. 1 Edwards, 150 ft. to N and W lines of farm in Martinez Sur. ..... T.D. 1,490 ft.; standing.
Callahan Final Oil Co.'s No. 1 B. H. Buck, 900 ft. to E line, 3,200 ft. to S line of farm, in J. M. McGamley Sur. ..... T.D. 650 ft.; S.D.
Dr. Ewell Neil's No. 1 J. Watson, 500 ft. from W line, 1,700 ft. from S line of B. Martinez Sur. ..... T.D. 2,400 ft.; S.D.
Jones & Voltz' No. 6 Bonkowsky ..... T.D. 650 ft.; drlg.
O. K. Oil Co.'s No. 1 Strum, 150 ft. S of N line, 150 ft. W of E line, John Grant Sur. ..... T.D. 150 ft.; drlg.
O. K. Oil Co.'s No. 2 Strum, 150 ft. from S line, 1,051 ft. W of E line, Juan Mantes Sur. ..... Drlg.
Schneider, Rees et al's No. 2 Claussen, 12 miles NE of San Antonio ..... T.D. 1,150 ft.; S.D.
S. W. Blount's No. 1 S. A. Land Co., I. Perez Sur., 1,000 ft. to N line, 450 ft. to W line of tract ..... T.D. 520 ft.; S.D.

CALDWELL COUNTY

Cole & Moseley's No. 1 Pierce, 150 ft. to NW and SW lines of tract, Solomon Seal Sur. ..... T.D. 825 ft.; S.D. for repairs.
Kistler, Stivers & Hendrick's No. 1 D. Carter, 400 ft. from NW line of Sur., 300 ft. NE of Creek in I. Allen Sur. ..... Rigging up.
Meyer's No. 1 G. C. and W. Walker, Solomon Seal Sur. ... T.D. 160 ft.; standing.

DUVAL COUNTY

John F. Camp's No. 1 Well, 990 ft. NW and 150 ft. NE of cen. of Sur. No. 570 ..... Rigging up.
Frank Gravis et al's No. 2 Schallert, 425 ft. to E line, 150 ft. to S line of Blk. 10, Cain & Smith Subd. "A", Sur. No. 255 ..... T.D. 1,610 ft.; drlg.
O. W. Killam's No. 1 Peters, 150 ft. from E line, 450 ft. from N line of SE of Sur. No. 1 ..... T.D. 2,165 ft.; drlg.
Seacord and Putnam's No. 1 J. W. Johnson, 150 ft. to S and W lines of NW NW, Sur. 44 ..... Spudded in.
Smith & Capps' No. 1 Duval ranch lands, 150 ft. from SW and SE lines of Sur. No. 574 ..... Location.
Suttle et al's No. 1 Bennett, 150 ft. from N and E lines of Sur. No. 44 ..... Rigging up.
R. A. Thompson's No. 1 Parr, 2,640 ft. to W line, 12,160 ft. to S line of San Andres grant ..... T.D. 3,758 ft.; drlg.

FAYETTE COUNTY

A. D. Becker's No. 1 fee, 972 ft. from N line, 700 ft. from W line of tract in Williamson Sur. ..... Location.

GUADALUPE COUNTY

Barnhill et al's No. 1 H. L. Hoffman, 450 ft. to N and W lines of farm, in John G. King Sur. ..... T.D. 850 ft.; S.D.
Darst Oil Co.'s No. 1 Hamilton, 1,295 ft. from NW line, 150 ft. from SW line of 40-acre tract in J. H. Williamson Sur. ..... Location.
Luling Oil & Gas Co.'s No. 1 J. D. Brown, 160 ft. from N line, 450 ft. from E line of tract in C. Wall Sur. ... T.D. 1,527 ft.; drlg.
Tidal Oil Co.'s No. 1 Black, 1,231 ft. from NW line, 150 ft. from NE line of Valentine Bennett Sur. ..... Location.

GOLIAD COUNTY

Hoffman & Gooch's No. 1 Fromme, 600 ft. from N and 1,200 ft. from W line of Peter B. Dexter Sur. ..... T.D. 2,279 ft.; rig up to deepen.
Plymouth Oil Co.'s No. 2 Parks, 500 ft. S of No. 1 Parks.. Location.
Plymouth Oil Co.'s No. 1 Parks, 5 miles NE Goliad ..... T.D. 4,625 ft.; abnd.
Neal et al's No. 1 J. M. Pettus, 10,700 ft. to S line, 2,500 ft. to E line of Pedro Trevino Sur. ..... T.D. 4,565 ft.; standing.

GONZALES COUNTY

Crowder Oil Co.'s No. 1 Preston, 1,000 ft. from W line. 2,000 ft. from N line of W. W. Pace Sur. ..... Spudded in and S.D.
Edmiston & Kirby Petroleum Co.'s No. 1 J. W. Ward, Jr., 200 ft. from N and W lines of tract in Dan McKay Sur. ..... Location.
Johnson & Mattock's No. 1 J. James, 12 miles NE of Gonzales city, 900 varas from E line, 300 ft. from S line of tract in M. A. Williams Sur. ..... T.D. 200 ft.; drlg.
Nassamer, Gordon & Waldrop's No. 1 B. Botts, 2,500 ft. from E line, 650 ft. from S line in Sec. 6, Blk. 56, Gonzales Sur. ..... Abnd.

HIDALGO COUNTY

Barrett-Kanellos' No. 1 J. B. Brock, 7 miles W and N from Mission (on Monte Cristo road) ..... T.D. 4,000 ft.; S.D.
LaJoya Oil & Gas Co.'s No. 1 W. L. Hart, 6 miles W from Mission, north of San Fordyce ..... T.D. 4,500 ft.; contract depth.
Dayle L. Smith's No. 1, 18 miles W from Edinburg .... T.D. 4,026 ft.; standing, showing gas.
San Roman Oil Co.'s No. 1 J. T. Lomax, 7,500 ft. from S and E lines of San Roman Sur. ..... T.D. 2,500 ft.; drlg.
Dayle L. Smith's No. 3 Daskam, SW part of county ..... T.D. 1,230 ft.; drlg.

JIM HOGG COUNTY

L. W. Connor's No. 1 Holbien, 150 ft. from N and E lines of Blk. 7, Sur. 7, Holbien Subd. of Las Animas grant ..... T.D. 1,805 ft.; set csg.
T. P. Morgan's No. 1 fee, 2,223 ft. to N line, 1,640 ft. to E line of Share 19, Palo Blanco grant ..... T.D. 3,100 ft.; drlg.

JIM WELLS COUNTY

Gulf Prod. Co.'s No. 5 Shaeffer, SE cor. of Sur. No. 89... T.D. 3,044 ft.; comp. as gasser at 2,457 ft.
Vacuum Oil Co.'s No. 1 Seeligson, 4,500 ft. to W line, 75,000 ft. to S line of Los Jaboncillos Sur. ..... T.D. 4,350 ft.; drlg.

KARNES COUNTY

A. E. Edmiston's No. 1 O. L. Cochran, 150 ft. from S line, 500 ft. from E line of farm in D. B. McConnell Sur. ..... T.D. 1,800 ft.; standing.

KENDALL COUNTY

Dixon Oil Co.'s No. 1 Ottmar Behr, 823 ft. from S and N lines of Jessie Wilson Sur., 3 miles S of Sisterdale ..... T.D. 2,708 ft.; standing.
Fred S. Dibble's No. 1 Ellebrach, Sur. 77, N part of county ..... T.D. 50 ft.; S.D.

KERR COUNTY

George Ball's No. 1 F. A. Karger, 3 miles north of Kerrville ..... Rig on ground.
Evans & Gant's No. 1 E. Young, A. E. Burge Sur. No. 28.. T.D. 1,312 ft.; standing.
Evans & Gant's No. 2 Love, 150 ft. S and W line of Sur. 1,593 ..... T.D. 5,871 ft.; drlg.
Verde Oil & Gas Co.'s No. 1 J. D. Witt, 1,320 ft. from N line, 1,220 ft. from W line of Sec. 1,923, Hamilton Sur., 4 miles S from Center Point. T.D. 200 ft. Carried to this depth and abandoned as Herber Oil Co.'s No. 1 J. D. Witt ..... T.D. 270 ft.; drlg.

LIVE OAK COUNTY

Coastal Oil Finding Co.'s No. 1 Handley, 1,200 ft. from SE line, 400 ft. from SW line of tract in C. S. Cobb Sur. ..... T.D. 3,200 ft.; drlg.
J. A. Harper's No. 1 fee, 2,130 ft. to N line, 510 ft. to E line of farm, J. Pointevant Sur. No. 37 ..... Spudded in and standing.
Henderson Coquat's No. 1 Hewitt, 250 ft. from N and E lines of SW of Sec. 5, Thomas Adams Sur. ..... T.D. 1,785 ft.; S.D.
Henderson Coquat's No. 2 Sanger, 1,280 ft. NW of No. 1 Sanger ..... Rigging up.

LEE COUNTY

Henderson & Holden's No. 1 Dismuke, 600 ft. to E line, 150 ft. to N line of farm, J. Maxmillan Sur. ..... Rigging up.
A. H. Wheeler and associates' No. 1 fee, Blk. 47, H. Donohue Sur. ..... T.D. 3,890 ft.; S.D.
C. B. Polk et al's No. 1 Stoltz, Hiram Donohue Sur. .... T.D. 2,300 ft.; S.D.
Chadwick et al's No. 1 Hickey, 1,000 ft. to NW line, 300 ft. to NE line of farm in Varrelman Sur. ..... T.D. 20 ft.; spudded in.
Washington-Lee Oil Co.'s No. 1 L. Hicket, 1,100 ft. from N line, 200 ft. from E line of tract in J. D. Varrelman Sur. ..... Location.

McMULLEN COUNTY

Jacob, Buzzini & Pickett's No. 2 Jacob, 150 ft. NW of No. 1 Jacob ..... Location.
V. G. Shimmel's No. 2 Hale, 300 ft. S of No. 1 Hale..... Rigging up.

MAVERICK COUNTY

I. N. Boicourt's No. 1 Bandera, School Land ..... T.D. 2,284 ft.; standing

MEDINA COUNTY

Frank A. Brown's No. 1 Fohn, 150 ft. from E line, 790 ft. from N line of J. F. Torry Sur. No. 113 ..... T.D. 922 ft.; twisted off drill stem, fishing.

MILAM COUNTY

H. W. Elliott's No. 1 Marek, 767 ft. from N line, 500 ft. from W line of 160-ac. tract in B. Wickson Sur..... T.D. 3,000 ft.; S.D.
Red Bank Oil Co.'s No. 2-A J. A. Foster, 5,243 ft. to SW line, 150 ft. to NW line of farm ..... T.D. 5,655 ft.; abnd.
Frank A. Yeager's No. 1 Hose, 750 ft. from E line, 150 ft. from S line of lease in E. Allen Sur. ..... T.D. 1,376 ft.; set csg.

NUECES COUNTY

Camp and Stanolind Oil & Gas Co.'s No. 1 King, 600 ft. to N and W lines of Sec. 23, Richard King farm lots subd. ..... T.D. 1,250 ft.; drlg.
C. E. McCarthy's No. 1, W of Corpus Christi ..... Making location.

REAL COUNTY

McGinley Corp.'s No. 1 Haby, C of SW, Sec. 175 ..... T.D. 2,530 ft.; resuming drilling.

SAN PATRICIO COUNTY

John F. Camp's No. 1 Jackson, SW cor. of SW Sec. 30, 3 miles N from Edroy ..... T.D. 2,530 ft.; drlg.

STARR COUNTY

Davenport et al's No. 1 Wells, 30 miles W of Mission ... T.D. 1,093 ft.; casing stuck.
R. E. Johnson's No. 1 Goodrich, 1,214 ft. from N line, 1,065 ft. from W line of tract, 1½ miles N of Rio Grande City ..... T.D. 1,380 ft.; set csg.
Strauch Oil Corp.'s No. 1 M. E. Salinas, 155 ft. from N and W lines of lease in Porcion 80, Share 38 ..... T.D. 1,385 ft.; drlg.
R. B. Suttle's No. 1 Guerra, 2,000 ft. to N line, 270 ft. to W line of Porcion 110 ..... T.D. 810 ft.; no report.
Jess Williams' No. 1 Welsh, 1,120 ft. to W line, 1,500 ft. to N line of tract in Pedernal grant ..... T.D. 550 ft.; standing.

TRAVIS COUNTY

C. R. Franklin et al's No. 1 J. Wilson, 160 ft. from N and W lines of farm in A. Alexander Sur. ..... T.D. 1,180 ft.; S.D.
Fuchs et al's No. 1 Shiffler, 1,000 ft. to N line, 160 ft. to E line of farm, A. C. Caldwell Sur. ..... T.D. 515 ft.; standing.
Ray & Henze's No. 1 Hatech, in C of tract in S. Hamilton Sur. ..... T.D. 540 ft.; S.D.

WEBB COUNTY

O. W. Killam's No. 4 Bruni, 5,050 ft. to NE line, 7,675 ft. to SE line of El Ranchito tract, J. V. Borrego grant ..... T.D. 1,075 ft.; drlg.
Power & Dettenhalm's No. 1 Cowan & Goss, 1,870 ft. from W line, 1,656 ft. from N line of Sur. No. 1,606. T.D. 405 ft.; standing.
Fansler, Johnson & Peacock's No. 1 Laurel, 425 ft. to N line, 600 ft. to E line of Blk. 10, Sur. 271 ..... T.D. 1,872 ft.; drlg.
W. R. Shankle's No. 1 Ellison Furniture & Carpet Co., 150 ft. from SW and NW lines of Blk. 2, Sur. 466 ... T.D. 1,915 ft.; drlg.

WILLIAMSON COUNTY

Burns et al's No. 1 Wilder, 1,800 ft. to N line, 200 ft. to W line of tract in H. Owens Sur. ..... T.D. 1,480 ft.; no report.
Hays & Gee's No. 1 E. G. Johnson, 1,800 ft. from N line, 170 ft. from E line of tract in B. C. Low Sur., S of Georgetown ..... T.D. 1,595 ft.; S.D.
McLean et al's No. 2 R. C. Miller, 800 ft. to S line, 100 ft. to W line of tract in B. Manlove Sur. ..... Rigging up.
McNeil et al's No. 1 W. R. Lane, 450 ft. from NW line, 150 ft. from SW line of 108.4-ac. tract in T. E. Shell Sur. ..... Spudded in.
G. B. Peterman's No. 1 Galler, 1,800 ft. from S line, 150 ft. from W line of 140-ac. tract in H.Y.&B.R.R. Sur. ..... T.D. 1,100 ft.; drlg.
R. S. Wilson's No. 1 Speckles, 150 ft. N of road, 600 ft. from W line of farm in J. Jordan Sur., 1 mile N of Coupland ..... T.D. 875 ft.; S.D.

ZAPATA COUNTY

Ballard & Mercer's No. 1 Flores, 500 ft. from NE line, 580 ft. from SE line of Blk. 27, Porcion 37 ..... T.D. 2,024 ft.; drlg.
George Ball's No. 1 Gutierrez in Charco Redondo grant, taken over from Moore et al to deepen ..... T.D. 2,065 ft.; drlg.

ZAVALLA COUNTY

Carpenter & Jenkins et al's No. 1 John Wolf, Sec. 8, Abstract 1,199 ..... T.D. 767 ft.; setting csg. to test show of gas.

It's Raining

...We can't work today!

When it rains in the field, work suffers. You cannot successfully coat and wrap pipe in the field under bad weather conditions. The weather becomes an item of expense. It slows up or halts work. With General Paint Corporation's Hill-Hubbell Process of mill-coated and wrapped pipe, weather conditions are always ideal because the coating and wrapping are applied at the pipe mill under controlled temperatures. No moisture can be entrapped. The problem of mud and grease of field-coated and wrapped pipe is entirely eliminated.

Such has been industry's demand for this first successful process of wrapping and coating pipe at the mill, that over 5,000 miles (over 15,000 car-loads) of Hill-Hubbell mill-wrapped pipe have already been laid. The largest gas and oil companies in the United States use Hill-Hubbell mill-coated and wrapped pipe.

General Paint Corporation's Hill-Hubbell pipe wrapping equipment is installed in seven of the largest and most strategically located steel plants in the United States, in order to give complete service for all orders. Sizes from ¾ in. to 26 in. are efficiently and economically protected.

Felt and Kraft wrapping applied under tension.

Plants for coating and wrapping by the Hill-Hubbell Process are located in the following cities for the production of the pipe manufacturers listed:

CENTRAL TUBE COMPANY, *Ambridge, Pa.*

JONES & LAUGHLIN STEEL CORP. *Aliquippa, Pa.*

NATIONAL TUBE COMPANY, *Lorain, Ohio*

REPUBLIC STEEL CORPORATION, *Youngstown, Ohio*

SPANG-CHALFANT & COMPANY, *Ambridge, Pa.*

YOUNGSTOWN SHEET AND TUBE COMPANY, *Indiana Harbor, Ind., and Youngstown, Ohio*

For complete information write to any of the offices of the General Paint Corporation listed below.

HILL-HUBBELL DIVISION OF

GENERAL PAINT

CORPORATION

New York, 11 Broadway
Chicago, address Hill-Hubbell & Co., 105 West Adams Street

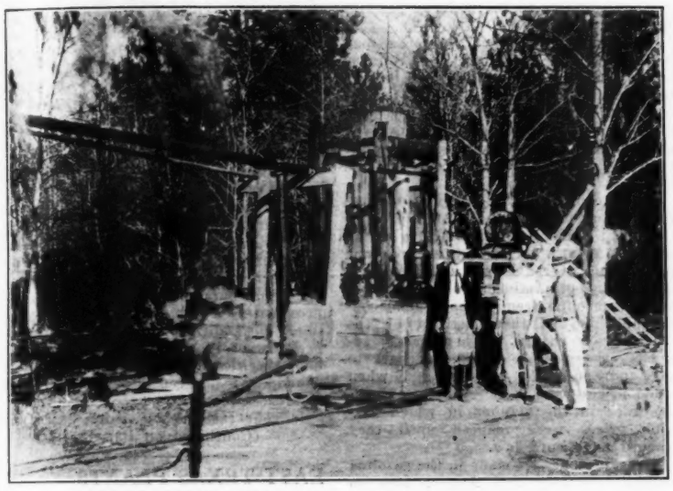
Portland, Ore., Seattle, Wash., Houston, Texas, Spokane, Wash.

Tulsa, Oklahoma
Los Angeles, 544 Mateo Street
San Francisco, 160 Fremont St.

UNIQUE DESIGN IN LOCAL PLANT HANDLING OUTPUT OF ONE WELL

HOUSTON, Tex., Mar. 12. — Conroe Oil & Refining Co., in its new skimming plant at Grand Lake Switch, south of Conroe, Montgomery County, Texas, has a set-up which is proving ideal for a small local refiner. The plant, although small and simple in operation and built with a minimum of investment, is turning out a high antiknock gasoline with comparatively little overhead and with efficient results.

The plant is operating on a 56 gravity oil from a single wildcat well completed last December by the Strake Oil Corp. and which has been producing a little over 100 bbls. daily. The well, the first producer in the county and over 35 miles from any of the coastal fields, is approximately 2½ miles from the plant and is run under its own pressure, leaving the separator at around 300 pounds.



New type steam generator used by Conroe Oil & Refining Co. at its recently completed 250-bbl. topping plant near Conroe, Tex. In the picture are J. E. Pierce of Houston, inventor; Joe Sharvin, operator at plant, and W. J. Pfiffner, secretary-treasurer of company.

The charging stock consists chiefly of gasoline and kerosene, which has necessitated only the simplest of equipment and processes. At present the plant is being run about fifty-fifty to those products but that can be varied according to requirements. The gasoline has been a 60 gravity, 370 endpoint product with a 66 octane number, which compares favorably with the best regular gasolines being marketed on the Gulf Coast. The entire yield is being sold directly to local and Houston jobbers who fill up in their own tank wagons at the plant. Sales are made only to jobbers who help maintain a uniform price structure and not to "bootleggers." Although the plant is on a railroad, no loading rack has been installed as yet and only sales to tank wagons are made.

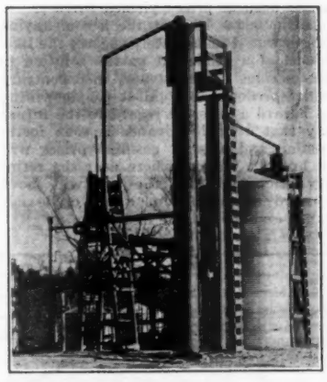
The plant also has a good kerosene market locally. There is no natural gas distribution in Conroe or Montgomery County and kerosene is used largely for lighting and heating, as well as for tractor and other farm needs, this being farming country and there being no other close-by refinery competition.

Cost of Operation

Cost of operation is almost negligible, except for the requirement of salary of one man on each shift and what little depreciation there might be. Sufficient gas for fuel is trapped off the oil as it comes to the plant. The oil, leaving the well separator at a pressure of 300 pounds, carries a considerable volume of absorbed gas, which is released in a small separator at the plant through which the fluid is run before going to storage and thence into the system. The gas released in this separator then is run through an absorption tower where it is stripped of any remaining fluid and then as dry gas it is taken for fuel use, whereas otherwise it would be wasted.

Fluid from the bottom of this absorption tower is charged with crude from storage into the system, first through a steam heated preheater, where the temperature is raised to around 160°, thence through another heater or steam still where the temperature of the oil is raised to around 310°, and thence into a baffle tower from which the gasoline ends are taken off as vapor and run through condensers and to storage. The bottoms as kerosene are run by gravity from the bottom of the tower to storage.

Water also is obtained without cost, this being pumped directly out of slough by the plant either for boiler or cooling purposes. By a coincidence, the slough is composed of three natural ponds which overflow into each other consecutively and this arrangement has eliminated the necessity for a cooling tower. The plant is located high up on the bank of the slough and the hot water from the plant is flowed by gravity into the first pond and by the time the water gets to the third pond it is cool enough for use again.



Installation of Conroe Oil & Refining Co.'s small topping plant recently put in operation at Grand Lake, 5 miles south of Conroe, Montgomery County, Texas.

The boiler, or superheated steam generator, is one invented by J. E. Pierce and supplied by T. T. Word Supply Co. Its design is such that it is foolproof and needs virtually no attention and is unaffected by corrosive water, which is charged rapidly through the coils. The generator, the first of its kind used in refinery operation, weighs only 5,100 pounds, can carry between 500 and 1,000 pounds of steam, can deliver steam within eight minutes after firing, and can develop 75 horsepower at 350 degrees. At the Conroe plant it is carrying only slightly more than 100 pounds pressure.

The gasoline is virtually free of sulphur content and requires no treating. Loading to tank wagons is done by gravity through a loading connection located a short distance down hill from the gasoline storage.

A. N. Munhall is president of the company and is in charge of the operation. Thomas Kehoe of Houston is vice president and W. J. Pfiffner is secretary-treasurer.

Dr. Bybee Addresses Fort Worth Geologists On Big Lake Pool

FORT WORTH, Tex., Mar. 12.—Dr. Hal P. Bybee of the University of Texas Land and Lease Board, San Angelo, gave a most interesting and illustrated talk on the deep producers of the Big Lake Field, Reagan County, before members of the Fort Worth Geological Society and others in Fort Worth.

The Big Lake Field besides being the second oldest producing field in West Texas, came into added prominence in 1928 when Group No. 1 Oil Corp. and Continental Oil Co.'s No. 1-B University encountered deep pay formations below 8,000 feet, and opened up the highest gravity production yet found in the Permian Basin. It was completed at 8,525 feet producing 63.0 gravity oil which was almost pure gasoline. It continued to produce this gasoline-like high gravity oil for 18 months before the oil started darkening, and the gravity became lower. This changing of color and gravity is attributed to the high gas pressure diminishing, allowing lower gravity oil to come in from below, and change the entire texture and color of the crude in the well. As the wells have been deepened they have produced lower gravity, heavy oil, which bears out this theory. This lower gravity oil is perhaps coming from the Ellenberger.

Dr. Bybee used charts, cross sections and a peg model to demonstrate his viewpoints on the nine deep producers in the field, the peg model graphically depicting the difference in the formations in the deep wells, the dip in the Ellenberger and other formations, and the location relations of the wells.

Some of the main points in his talk dealt with gas content of the oil, pressures, oil-gas ratio, gravity of the oil, temperatures, and formations in the field. The gasoline content of the gas was stated to be 0.695 gallon per 1,000 feet of gas. This includes the gas from the 3,000 to 9,000-foot pay horizons.

Gravity of oil in one well on November 5, 1930, was 55.7; one year later it had fallen to 45.2 degrees gravity, and at the present time it is down to 43.4 degrees. Oil from another deep well tested 60.8 degrees on November 5, 1930, fell to 52.3 the next year, and at present is down to 43.3 degrees. Average gravity of the oil from the nine producers is 50.2 degrees, or about 20 degrees higher than the majority of the oils found in the various pools in the Permian Basin. Gravity of the oil in the nine wells ranges from 42.1 to 67.5 degrees.

All of the deep wells are not yet tubed, and those which have been tubed are dissimilar in this respect. The 3-inch is on bottom in some of the wells, 4-inch tubing hangs higher in the hole in others, while one has 2-inch on bottom, and 4-inch tubing has also been landed on bottom in another.

The average increase in temperatures in the deep wells was 1° F. to every 54 feet. Temperatures in the holes range as follows:

5,720 feet	122° F.
6,500 feet	135° F.
7,000 feet	143° F.
7,500 feet	152° F.
8,000 feet	162° F.
8,300 feet	170° F.

The average oil production per acre for the nine deep wells is 37,698 bbls., and 290,000,000 feet of gas per acre, up to February 23, 1932. There are 300 acres developed by the nine deep wells, which allows 33⅓ acres per well. Bottom hole pressures is in the neighborhood of 3,600 pounds.

Some water has shown up in the Ordovician lime. One well was plugged back 178 feet to shut off the water. Big Lake Oil Co.'s No. 5-C University is making 3.5 per cent water while producing 5,000 bbls. of oil per day, which is a negligible amount of water.

Initial production of Group 1 Oil Corp. and Continental Oil Corp.'s No. 3-B University was 2,550 bbls. of oil with 12,250,000 feet of gas, at total depth of 9,020 feet. Seven-inch casing was cemented at 7,795 feet in this well, the deepest in the field.

THE OIL MAN'S CALENDAR

March

21-27—Los Angeles, Calf., third annual Oil Equipment and Engineering Exposition.

23-25—Detroit, Mich., Michigan Oil Men's Association, Statler Hotel.

24-26—Oklahoma City, Okla., American Association of Petroleum Geologists.

28-Apr. 1—New Orleans, La., American Chemical Society.

29—Ranger, Tex., Plant Operators meeting, Natural Gasoline Association of America.

April

2-10—Detroit, Mich., National Aircraft Show.

6-8—Excelsior Springs, Mo., Western Petroleum Refiners Association.

6-8—Birmingham, Ala., Distribution Committee, Technical Section, American Gas Association.

11-16—Boston, Mass., ninth annual convention, American Oil Burner Association.

14-15—Tyler, Tex., spring meeting, Southwestern District, A.P.I., Division of Production.

21-22—Cleveland, Ohio, semiannual meeting, National Petroleum Association.

22-24—Dallas, Tex., Petroleum Industry Electrical Association, Baker Hotel.

27-29—White Sulphur Springs, W. Va., National Pipe and Supplies Association, Greenbrier Hotel.

27-29—New York, annual meeting, American Welding Society.

May

4-6—Honolulu, Hawaii, National Foreign Trade Council.

9-11—Tulsa, Okla., Natural Gas Department, American Gas Association.

9-13—Atlantic City, N. J., National Fire Protection Association.

17-19—Tulsa, Okla., Natural Gasoline Association of America, Mayo Hotel.

June

1-3—Tulsa, Okla., mid-year meetings, American Petroleum Institute, Mayo Hotel.

6-9—Detroit, Mich., National Association of Purchasing Agents.

20-24—Atlantic City, N. J., American Society for Testing Materials.

September

14-16—Atlantic City, N. J., Annual meeting, National Petroleum Association.

22-23—Chicago, National Association of Motor Bus Operators.

November

15-17—Houston, Tex., Annual meeting, American Petroleum Institute.

Manufacture of Natural Gasoline

Program of Ranger Plant Operators Meeting Announced

The program for the next annual meeting of the Ranger plant operators has been completed and includes many interesting papers. These meetings will be held in the Gholson Hotel in Ranger, Tex., starting at 10 o'clock March 29 and during the morning three papers will be read followed by discussion in the afternoon meeting. An evening meeting will be held between 7:30 and 8:30 followed by a dance at the Ranger Country Club.

The detailed program is given below.

Morning session 10 a.m. until 12 noon.

Chairman, E. R. Lederer, Texas Pacific Coal & Oil Co.

1. Operation and Maintenance of Tank Cars. J. C. Carrothers, Lone Star Gasoline Co.

2. New Vapor Pressure Methods and Their Application in the Manufacture and Shipment of Natural Gasoline. Warren Felton, Phillips Petroleum Co.

3. Economy in Automobile Operation. F. L. Richardson, Lone Star Gasoline Co.

Luncheon at American Legion Hall.

Afternoon session 1 p.m. until 4 p.m.

Chairman, J. R. Jarvis, Lone Star Gasoline Co.

1. Inspection of exhibits.

2. General discussion of operating problems.

Discussion led by:

H.C.Condley, Consolidated Gasoline Co.
Stewart Cate,Breckenridge Gasoline Co.
W.E. Smith,Mid-Kansas Oil & Gas Co.
C. S. Bronstead, Texas Pacific Coal & Oil Co.
J. F. Mayo, Lone Star Gas Co.
J. S. Bates, Lone Star Gasoline Co.
H. C. Webb, Hanlon Gasoline Co.
J. S. Steed, F. B. Joyce, J. P. Wetherall, I. F. Waters, Phillips Petroleum Co.

Evening session 7:30 p.m. until 8:30 p.m.

Safety and Job Interest. L. H. Taylor, Lone Star Gas Co.

Safety in Plant Operation. C. L. Hightower, Texas Pacific Coal & Oil Co.

Plant operators quartet.

Dance at Ranger Country Club.

NATURAL GASOLINE PRICE TREND IS INCONSISTENT

Inconsistency marks the relationship in the price trends of natural gasoline, refinery motor fuel, filling station gasoline and crude oil over the past six months to such an extent that certain facts border on the absurd.

Natural gasoline, for instance, has been selling below the posted price of 36 gravity crude for more than a month. Another unusual fact is that natural gasoline prices are so low, with respect to the refinery gasoline price for U. S. Motor of 60 octane number, that it "pays" the refiner well to increase the octane rating of his gasoline by the use of natural. Along with the profit in blending more natural into the refinery gasoline comes the advantage to the refiner of moving the blend more easily than offering out a low octane gasoline on an already weak "no octane" motor fuel market.

Of equal inconsistency is the fact that sales managers, refiners and jobbers are aware of these conditions yet the Mid-Continent price persistently remains low.

From the graph which is included here, the price trends of Mid-Continent natural gasoline, Mid-Continent U. S. Motor refinery gasoline, the average gasoline filling station price in 50 scattered cities and the posted price for Mid-Continent crude of 36 gravity are shown over the past five years.

While there is no question but that these curves have a common downward trend since August, 1928, there are many inconsistencies during the period, if intervals of three or six months are studied.

One relationship which shows up rather forcefully is the lesser price fluctuations in the refinery motor gasoline for any given period. Thus, while the refinery gasoline market moved along on a relatively uneventful course, natural gasoline fluctuates over a wide range. Natural gasoline is shown above the refinery price at one time and in less than two months later was selling at a price 2 cents below the refinery price. In another two months the price was temporarily restored above the refinery price. This happened in the closing months of 1928 and the first two months of the following year. During the great bulk of the time, however, the natural gasoline price remained below the refinery price. For this reason, and to avoid the ruinous price drops from time to time, many in the natural gasoline industry have favored making contracts for deliveries over a long period, based on the refinery gasoline market, and were willing to take a fixed differential in price below the refinery price.

They have felt that over a period of time the natural gasoline market would be stabilized and in turn would offer further stability to the refinery gasoline market.

The benefits from such a program may be seen in the present trend of refinery and natural gasoline prices. The general belief persists that the refinery market can not show any great improvement until natural gasoline prices are improved and the natural market has not shown enough genuine strength to bring this about.

When comparing the trend of natural gasoline prices with those posted for Mid-Continent crude, no consistency is shown month to month, but there is an apparent relationship over a long time. The price changes in both refinery gasoline and in natural gasoline seem to have gone considerably beyond that justified by the crude price change. When crude advanced, the gasoline market appears to have advanced too rapidly, and when crude prices were reduced there was little order in the manner in which gasoline prices were reduced until they reached an absurd low.

The rapid advance made in the gasoline market last July and August was no doubt prompted by the advances in the crude price but the level of gasoline prices took a serious drop again in September. Then, despite the further advance in the posted price of crude in November, gasoline prices are seen to rapidly decline from this time until January. With no change in the crude price over the balance of the time, refinery gasoline prices began a slow advance, while natural prices yielded further.

Although a look at the accompanying graph would immediately suggest the likelihood of a crude cut as the solution to the serious inconsistency, the contrary belief predominates. Most people willing to hazard a guess in regard to the future say that a crude advance is soon forthcoming and natural gasoline prices will be brought up somewhere near the refinery price and then the two will move upward in proportion to the crude advance and the volume of buying.

Constant Care in Rectifier Control Adds to Efficiency

The modern practice of blending natural gasoline directly with refinery run stock to produce a motor fuel of the most desirable characteristics places a very rigid demand upon the natural gasoline manufacturer with regard to the quality of his product. To meet this refinery demand, natural gasoline must be water white, free of all fixed gases and substantially propane free. To produce water white gasoline requires careful handling of the various plant condensates and efficient dephlegmation. The satisfactory elimination of fixed gases and propane can be done only by rectification. The retifier has therefore become one of the most vital units of the modern natural gasoline plant.

Efficient operation of the rectifier is necessary to produce contniuously a specification product and to prevent the loss of desirable fractions. When operating upon a vapor pressure specification, the inclusion in the product of one-quarter of 1 per cent of propane at the expense of normal butane results in a loss of approximately 1 per cent of finished gasoline. In addition, whenever the vapor pressure of the final product drops below specification by four-tenths of a pound, a 1 per cent loss in production results.

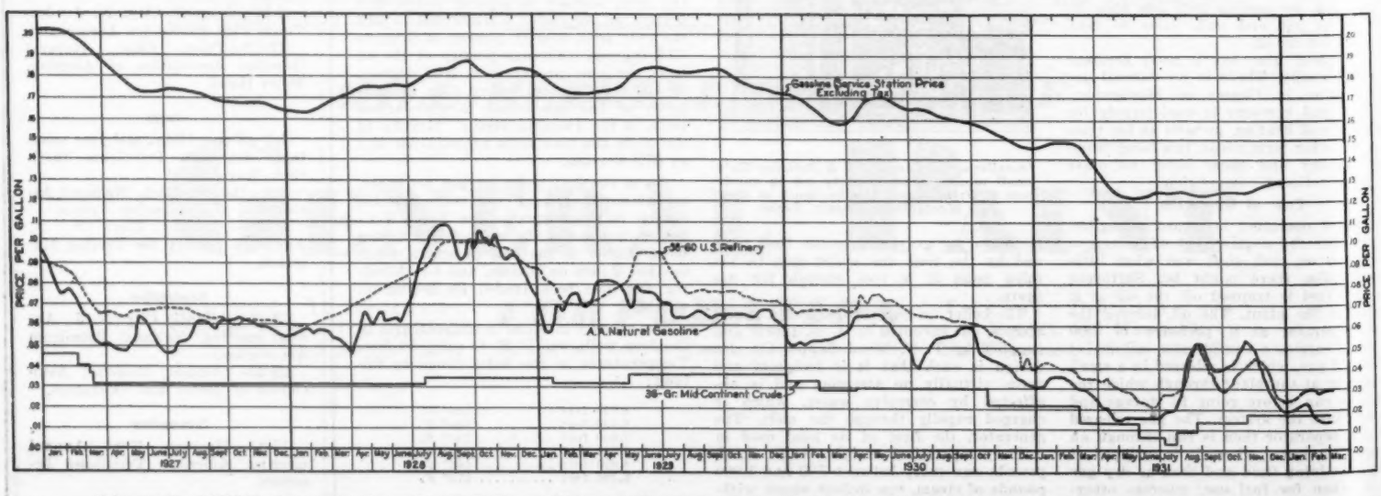
Is your rectifier efficient? If so, the

(Continued on Page 85)

EAST TEXAS PLANTS NEARING COMPLETION

The Arkansas Fuel Oil Co.'s casinghead gasoline plant in the Lathrop area, Gregg County, is practically ready for operation. This will be the first casinghead plant to be put into operation in this area.

The Gladewater Refining Co. has a compression plant in operation in the Gladewater area, western Gregg County. The Lisbon Gasoline Co. has its 5,000,000-foot capacity casing plant ready for operation in the southern Joiner area, Rusk County. Gulf Production Co.'s casinghead plant now under construction near London, Rusk County, will be completed and ready for operation in about three weeks. Compressors have been set, cooling systems installed, and gas gathering lines laid, leaving only the connection to wells and other minor construction work to be finished before it is ready for operation.



Price trends of Mid-Continent natural gasoline, U. S. Motor refinery gasoline, 36 gravity crude and the average filling station gasoline price in 50 scattered cities.

Brief Items for Petroleum Refiners

Wrightsman Succeeds Hopkins as Head of Standard of Kansas

C. B. Wrightsman, who for years has operated as an oil producer in the Mid-Continent and California areas, was chosen president of the Standard Oil Co. of Kansas at the annual meeting of stockholders in Neodesha, Kans., March 9, and at the age of 37 is one of the youngest executives of major oil companies. Mr. Wrightsman succeeds A. S. Hopkins, who remains with the organization as a vice president. The election of Mr. Wrightsman, who was the largest individual stockholder in the company, is expected to usher in greater activity in the production branch of the business and further mondernization of the refining plant in Neodesha.

E. A. Warren was re-elected a vice president. H. G. Lea was named secretary-treasurer, and A. L. Morrison assistant secretary-treasurer. Mr. Hopkins, Mr. Warren and Mr. Morrison reside in Neodesha. Mr. Lea resides in Tulsa. Mr. Wrightsman, until recently a resident of California, now resides in Wichita, Kans., where he is opening a Standard of Kansas office.

The company's executive offices will remain in Neodesha and Mr. Wrightsman expects to divide his time between Wichita and the refinery in Neodesha. Drilling and producing operations of the company will be directed from the Wichita office.

UNITED OILFIELDS TO BUILD NEW REFINERY

NEW YORK, Mar. 12.—United British Oilfields of Trinidad, Ltd., will build a new refinery and loading terminal, at a total expenditure of some £115,000, according to reports from London. A statement by the company in connection with its plans for expansion says, in part: "Since the beginning of 1930 a careful investigation has been made of the company's prospects as a producer of crude from its own fields, a purchaser of crude from other producers, and as a refiner and marketer.

"A new and larger refinery and better loading facilities for the shipment of products are required. The present refinery was completed in 1915, and while it has been maintained in an efficient state, it is now of obsolete design, ill adapted for handling the lighter crude which is now available, and inadequate in capacity. It is estimated that a new refinery and loading facilities will cost about £115,000."

NEW STELLARENE PLANT

CHATHAM, Ontario, Mar. 14.—The Northwest Stellarene refining plant in Coutts, Alberta, erected two years ago, is being torn down and will be replaced with a Dubbs unit at an estimated cost of $50,000. The new cracking plant, which will increase the refinery capacity materially, is being installed in connection with the manufacture of a high test gasoline for the Canadian market. The plant will operate on crude oil from the Kevin-Sunburst Field.

MacDONALD MADE SECRETARY

NEW YORK, Mar. 14.—A. C. Woodman, president of Richfield Oil Corp. of New York, announces the appointment of George P. MacDonald as secretary to succeed Ray Parker, Jr., who resigned to become vice president and general manager of Hartol Refining Co. and Hartol Products Co., Inc.

WESTERN PETROLEUM REFINERS ANNOUNCE ANNUAL PROGRAM

The program for the twentieth annual meeting of the Western Petroleum Refiners Association to be held in the Elms Hotel at Excelsior Springs, Mo., April 6, 7 and 8 has been practically completed and the following is announced by A. V. Bourque, secretary of the association. In addition to the program as announced tentative arrangements have been made for a discussion of the Pure Oil Co.'s research and development of the plan of polymerizing cracked gases for the manufacture of motor fuels.

WESTERN PETROLEUM REFINERS ASSOCIATION PROGRAM

TECHNICAL SESSION—1 P.M., APRIL 6
A. S. Hopkins, Chairman
Standard Oil Co. of Kansas

Opening remarks by the chairman.
"Construction and Maintenance of Furnace Brick Work," by Geo. P. Reintjes Co.
Discussion.
"Utilization of Refinery Gases," by H. M. Smith, Brueau of Mines, Walter J. Podbielniak.
Discussion.
"Increasing Octane Values in Gasoline Through Design and Operation of Reforming Units," by M. R. Walton, A. G. McKee Co.
Round Table Discussion: Report of developments in gasoline specifications—H. W. Camp; report of developments in lubricating oil specifications—L. C. Eldridge.
Activities of Manufacturers Committee for 1932.

MORNING SESSION—9:30 A.M., APRIL 7

Further discussion of papers presented.
"Progress of Determination of Knock Rating." (Author to be announced.)
Discussion.
"The Value of Natural Gasoline to the Refiner," by Emby Kaye, Skelly Oil Co.
Discussion.

GENERAL SESSION—1 P.M., APRIL 7

Opening remarks by the president.
Appointment of committees.
"The Race for Higher Octane Numbers." (Papers by the manufacturers and sales representatives of companies to be announced.)
Discussion.
"A discussion of the Diesel Engine, Particularly the Improvements Which We Have Incorporated Into Our Airplane Engines," by G. A. Guiberson, Jr., of the Guiberson Corp.
Discussion.
"Recent Developments of Cracking Light and Heavy Oils," by Universal Oil Products Co.
Discussion.
"Effect of Evasion of Gasoline Tax on the Refiner," by F. V. Martinek.
Discussion.
Report of committee on specifications for gasoline and lubricating oil.
Shall the by-laws be amended to provide for four vice presidents instead of three?

MORNING SESSION—9 A.M., APRIL 8

Reports of committees and election of officers.
"The Determining Price Factor," by W. C. Platt, National Petroleum News.
Discussion.
"Sales Contracts and Basic Price Structure for Tank Car Gasoline," by R. W. McDowell, Mid-Continent Petroleum Corp.
Discussion.
"Blue Gasoline—Its Place, Its Value, Its Future." (Author to be announced.)
Discussion.

MAY REOPEN LUB OIL REFINERY AT WARREN

NEW YORK, Mar. 12.—Stockholders of Swan Finch Oil Corp. will vote March 21 on matters relating to Swan Finch Refining Co. of Delaware, which has not been operating since March, 1930, and in which the parent company has an investment of more than $500,000.

Necessity of action, the stockholders have been informed, arises from a bond issue of $192,000, representing part of the purchase price, and held mainly by residents of Warren, Pa. Alternative proposals have been submitted for action by the stockholders.

The first proposal is to extend the moratorium on interest and principal payments on the bonds to March 1, 1933, and, providing that no purchaser is obtained for the properties and the refining company is unable to resume operations at Warren, Pa., meanwhile, the corporation will turn over its stock in the refining company to the bondholders, the latter taking possession of the plant.

The second plan is that the Warren group shall raise $25,000 in cash by issuance and sale of preferred stock in a new corporation formed to acquire the assets of the refining company, and that bondholders accept $71,500 principal amount of 6 per cent 10-year debenture bonds for their bonds now outstanding, the Swan Finch Oil Corp. to exchange its common stock and its other interest in the present refining company for a 10-year common stock interest in the new company.

The letter to stockholders emphasizes the fact that Swan Finch Oil Corp. is not responsible for any liabilities or debts of the refining company, and that under present conditions in the petroleum industry it can find no justification for further advances to the Delaware unit.

GERMAN PLANTS OPERATING

The availability of crude oil from German fields will enable the I. G. Farbenindustrie to continue operation on a normal basis at its Leuna plant, according to an official announcement. It had previously been announced that the plant which has been manufacturing synthetic gasoline from brown coal would be operated on a curtailed basis. The management recently concluded arrangements for delivery of Thuringian crude oil.

Vickers to Build New Refinery in Rice County Area

The Vickers Petroleum Co. of Wichita, Kans., will start construction immediately of a new refinery to be located in Rice County, according to an announcement by J. A. Vickers, president of the company. The company for several years has operated a refinery at Potwin near Wichita with a rated crude oil capacity of 3,500 bbls. daily with additional cracking facilities.

The new plant will have an initial capacity of 1,000 bbls. daily and this will be increased later if needed. It will be located adjoining the townsite of Raymond on the Santa Fe Railroad. The plant will consist of a pipe still distillation unit and other necessary equipment.

The Vickers Co. has production in Rice County and the new plant will be operated with this oil. The products will be sold largely to local markets.

BUILD LUBRICATING PLANT IN ARGENTINA

Minister of Agriculture de Tomaso has decreed the immediate expenditure of $1,250,000 for the construction at La Plata of a refinery for the preparation of lubricants which will handle 400 tons of crude oil daily, according to reports from Argentina. The country has been importing 50,000 tons of lubricants a year. Sales of legally distilled naphtha and kerosene are reported to have been highly profitable for the government.

The government refinery, built several years ago, has a crude oil capacity of 14,000 bbls. with cracking equipment. Headquarters are located at Calle Paseo, Colon, 922 Buenos Aires.

SHERWOOD REFINING CO. ENLARGES MUTUAL PLANT

WARREN, Pa., Mar. 14.—The Sherwood Refining Co., which recently took over the business of the Mutual Refining Co. here, has been remodeling and enlarging the Mutual plant. It has added a barrel house and three agitators and increased the filtering capacity. The plant now has a capacity of 750 bbls. daily, making lubricating oil, petrolatum and white oil.

The Sherwood Refining Co., whose general offices are in Brooklyn, N. Y., has the following officers: President, general manager and chief purchasing agent, H. H. Sherwood; vice president, H. H. Watkins; secretary, James W. Jackson; treasurer, G. D'Amore; general superintendent of refineries, Elmer Peters. V. L. Roberson is manager of tank car sales, William F. Kroneman is manager of service station sales, and Dr. R. R. Rosenbaum, chief chemist.

McCOLL-FRONTENAC EXPANSION

CHATHAM, Ontario, Mar. 12.—McColl-Frontenac Oil Co. is planning construction of a 3,000,000-gal. bulk storage plant with 5-truck garage and warehouse facilities at Welland, Ontario, to cost between $60,000 and $70,000. The company has also bought a 5-acre site at East Windsor for a terminal storage plant, including three storage tanks and combined warehouse and office building. Dock facilities have been leased on the Detroit River and a pipe line will be laid from the dock to the plant, the company's products being unloaded from tankers and distributed to western Ontario points by rail.

REFINERY AND CRUDE PRICES

Quotations on refined products are for interstate or export movement unless otherwise noted.

GASOLINES

OKLAHOMA (Group 3)—	Mar. 15		Mar. 8	
*U. S. Motor	.03½	.03⅝	.03¼	.03⅜
60-62 400	.03⅝		.03⅜	.03½
64-66 390	.03¾	.03⅞	.03⅝	.03¾
64-66 375	.03⅞	.04	.03¾	.04
68-70 350	.04⅛	.04¼	.04	.04⅛
NORTH TEXAS—				
*U. S. Motor	.03⅜	.03½	.03¼	
60-62 400	.03½	.03⅝	.03⅜	
64-66 390	.03¾	.03⅞	.03⅝	.03¾
64-66 375	.03⅞	.04	.03¾	.03⅞
64-66 360	.04⅛		.04	
‡NORTH LOUISIANA—				
*U. S. Motor	.03¾		.03¾	.04
60-62 400	.04		.04	
‡ARKANSAS—				
*U. S. Motor	.03¾		.03⅝	.03¾
CHICAGO Based on Okla. (Group 3)—				
*U. S. Motor	.03½	.03¾	.03	.03¼
60-62 400	.03⅝	.03⅞	.03¼	.03½
64-66 375	.03⅞	.04⅛	.03¾	.04
Aviation fighting grade	.04⅜	.05¼	.04½	.05
68-70 360	.04⅛	.04¼	.04	.04¼

Octane Ratings—Above quotations cover price ranges on gasolines in which no octane rating is given. In the case of the U. S. Motor and 60-62 400 endpoint grades where an octane rating of 57-65, inclusive, is guaranteed, prices are three-eighths cent per gallon higher than quotations shown in above tables; where an octane rating of better than 65 is guaranteed, the prices are five-eighths cent higher. In the case of the remaining grades, gasolines of 65 octane rating or higher are quoted one-fourth cent higher than the quotations shown in above tables. Unless otherwise provided by agreement of buyers and sellers, the Series 30 testing equipment of the Ethyl Gasoline Corp. is recognized as standard in determining octane ratings.

*Present distillation specifications on U. S. Motor gasoline are: 10 per cent evaporated, 167° F. maximum; 50 per cent, 284° F. maximum; 90 per cent, 392° F. maximum; residue not exceeding 2 per cent; maximum vapor pressure, 12 pounds. Additional specification on U. S. Motor gasoline available from bulletins of Bureau of Mines, Washington, D. C.

‡For Arkansas, Louisiana and Mississippi delivery.

PENNSYLVANIA (inland refineries)—				
U. S. Motor	.04		.04	.04⅛
60-62 400	.04		.04¼	
64-66 375	.04¾		.04¾	.05
68-70 350	.05¼		.05¼	

Octane Ratings—In the case of U. S. Motor and 60-62 400 endpoint grades, same price differentials based on octane ratings as shown in above tables for Oklahoma and other Mid-Continent areas.

CALIFORNIA (domestic movement only)—				
54-58 U. S. Motor	.04½	.05	.04½	.05
58-60 400	.05	.05½	.05	.05½
EAST COAST—				
U. S. Motor, below 65 octane:				
New York (Bayonne)	.05½	.05¾	.05½	.05¾
Boston	.06		.06	
Baltimore, Md.	.06		.06	
Charleston, S. C.	.06		.06	
U. S. Motor, 65 octane and above:				
New York (Bayonne)	.06	.06½	.06½	
Boston	.06	.06¾	.06¾	
Baltimore, Md.	.06	.06¾	.06	.06½
Charleston, S. C.	.06½		.06½	

NAPHTHAS

OKLAHOMA (Group 3)—	Mar. 15		Mar. 8	
50-52 450 (blending)	.03⅜	.03½	.03¼	.03⅜
PENNSYLVANIA (inland refineries)—				
50-54 430-450 (blending)	.04		.04	
ARKANSAS—				
48-50 450 (blending)	.03½	.03¾	.03⅜	.03¼
CHICAGO Based on Okla. (Group 3)—				
50-52 450 (blending)	.03¼	.03½	.02⅞	.03⅛
Cleaners' naphtha, 56-58 gr. 200 i.b.p.-320 e.p.	.05⅝	.05⅞	.05⅝	.05⅞
Lacquer diluent, 180 i.b.p.-250 e.p.	.09	.09¼	.09	.09¼
Lacquer diluent, 140 i.b.p.-200 e.p.	.09	.09¼	.09	.09¼
Rubber solvent, 68-70 gr., 100 i.b.p.-300 e.p.	.05¾	.06¼	.05¾	.06¼
Stoddard solvent, 300 i.b.p.-410 e.p., over 100° flash	.04⅞	.05⅛	.04⅞	.05⅛
Pet. thinner, 290, 300 i.b.p.-415 e.p., over 83° flash	.04⅜	.04⅝	.04⅜	.04⅝
V.M.&P. naphtha, 56-58 gr., 190-200 i.b.p.-330 e.p.	.05¼	.05½	.05¼	.05½
Petroleum spirits	.03⅞	.04¼	.03⅞	.04¼

NATURAL GASOLINES

OKLAHOMA (Group 3)—	Mar. 15		Mar. 8	
Grade 18-55	.02	.02¼	.01¾	.02⅛
Grade 26-70	.01⅝	.01¾	.01⅝	.01½
Grade 30-70	.01½		.01¼	
NORTH TEXAS—				
Grade 18-55	.02	.02⅛	.01¾	.02
Grade 26-70	.01⅝	.01¾	.01⅝	
Grade 30-70	.01½	.01⅝	.01¼	
NORTH LOUISIANA—				
Grade 26-70	.02		.01¾	
CALIFORNIA—				
75-78 375	.04¼	.05	.04¼	.05

Note—Grades 18-55, 26-70 and 30-70 are three of 24 grades adopted by the Natural Gasoline Association of America effective January 1. The grades are based on pounds vapor pressure and amount evaporated at 140° F. See page 74 of January 7 issue for explanation of new grading system. While not exactly the same specifications apply, Grade 18-55 corresponds to the former Grade A; Grade 26-70 to former Grade AA and Grade 30-70 to former Grade BB.

KEROSENES

(All kerosenes water white)

OKLAHOMA (Group 3)—	Mar. 15		Mar. 8	
41-43	.02⅝	.02¾	.02⅝	.02¾
42-44	.02¾		.02¾	.02⅞
NORTH TEXAS—				
40-41	.02⅝		.02⅝	
41-43	.02¾		.02¾	
‡NORTH LOUISIANA—				
41-43	.03¼		.03	
42-44	.03¼	.03½	.03¼	
‡ARKANSAS—				
41-43	.03	.03¼	.03	.03¼
PENNSYLVANIA (inland refineries)—				
45	.04		.04	
46	.04¼		.04¼	
47	.04⅜		.04⅜	
CHICAGO (Based on Group 3)—				
41-43	.02⅝	.02¾	.02½	.02⅝
42-44	.02¾	.03	.02⅝	.02¾
***CALIFORNIA—**				
38-40 high burning test	.03¾	.04½	03¾	.04½
NEW YORK (Bayonne, N. J.)—				
41-43	.05¼	.05½	.05¼	.05½

*For Pacific Coast consumption.
‡For Arkansas, Louisiana and Mississippi delivery.

TRACTOR FUELS*

OKLAHOMA (Group 3)—	Mar. 15		Mar. 8	
39-41 prime white	.02¼		.02¼	
38-40 light straw	.02	.02⅛	.02	.02⅛
NORTH TEXAS—				
38-40 light straw	.02	.02¼	.02	.02¼
CHICAGO (Based on Group 3)—				
38-40 light straw	.02	.02⅛	.02	.02⅛
PENNSYLVANIA (inland refineries)—				
41-43 prime white	.03½	.03¾	.03½	.03¾

*There are no standard specifications for tractor fuels. Grades commonly sold have flash under 175° F. (open cup) and under 575° F. endpoint and less than .2 per cent sulphur. Tractor fuels are available from all Mid-Continent refining groups at prices in line with the Oklahoma market taking into consideration differentials in freight rates.

FURNACE OILS*

OKLAHOMA (Group 3)—	Mar. 15		Mar. 8	
32-36 straw	.01¾	.01⅞	.01¾	.01⅞
36-38 straw	.01¾	.02	.01⅞	.02
38-40 straw	.02	.02½	.02	.02½
39-41 prime white	.02⅛	.02¼	.02⅛	.02¼
NORTH TEXAS—				
38-40 straw	.02⅛	.02¼	.02⅛	.02¼
‡NORTH LOUISIANA—				
36-40	.02¼	.02⅝	.02¼	.02⅝
‡ARKANSAS—				
32-36	.02⅛	.02¼	.02	.02⅛
CHICAGO (Based on Group 3)—				
32-36 straw	.01⅝	.01¾	.01¾	.02
38-40 straw	.01¾	.02	.01⅞	.02⅛
PENNSYLVANIA (inland refineries)—				
40-41 prime white	.03½		.03½	
NEW YORK (Bayonne, N. J.)—				
32-36	.03½		.03½	
36-40	.04½		.04½	

*Above prices are for furnace oils of zero cold test, under 190° F. flash and good odor.
‡For Arkansas, Louisiana and Mississippi delivery.

GAS OIL, DIESEL OIL AND FUEL OIL

Gas oil (G.O.) quoted per gallon basis; Diesel oil and fuel oil per barrel.

OKLAHOMA (Group 3)—	Mar. 15		Mar. 8	
32-36 (G.O.) cracking stock	.01	.01⅛	.01	.01⅛
U.G.I. (G.O.)	.01	.01⅛	.01	.01⅛
32-36, zero to 15 (G.O.) high flash	.01¼	.01⅜	.01¼	.01⅜
28-30, zero to 10	.47½	.52½	.45	.50
26-30, zero to 10	.42½	.50	.40	.50
24-26	.37½	.42½	.37½	.42½
20-22	.30	.32½	.27½	.32½
16-20	.25	.27½	.25	.27½
Below 16	.22½	.25	.22½	.25
NORTH TEXAS—				
32-36 (G.O.) industrial	.01⅛		.01⅛	
22-26	.40	.45	.40	.45
Below 20	.30	.35	.30	.35
‡NORTH LOUISIANA—				
32-36 (G.O.) zero	.02	.02⅛	.02	.02⅛
14-16	.35	.40	.35	.40
‡ARKANSAS—				
30-32 (G.O.) zero	.02		.02	
14-16	.35	.40	.35	.40
CHICAGO (Based on Group 3)—				
32-36 (G.O.) industrial	.01⅛	.01¼	.01⅛	.01¼
28-30 (zero)	.55	.60	.55	.60
22-26	.32½	.37½	.32½	.37½
18-22	.25	.30	.25	.30
Below 18	.20	.25	.20	.25
PENNSYLVANIA (inland refineries)—				
36-40	.02⅞		.02⅞	

Note—Fuel oils of more than 40 cold test generally 5 to 10 cents per barrel less in all areas than shown in above tables.

‡For Louisiana, Arkansas and Mississippi delivery.

CALIFORNIA—				
30-34 (G.O.) per bbl.	.80	1.00	.80	1.00
27 plus Diesel	.75	.95	.75	.95
15-19 bunker (at tidewater)	.55	.75	.55	.75
15-19 bunker (cargo lots)	.55	.70	.55	.70
15-19 (tank cars)	.40	.70	.40	.70
GULF COAST—				
28-30 (G.O.)	.02¼	.02½	.02¼	.02½
Bunker C (bulk cargoes)	.38	.40	.38	.40
Bunker C (bunkers)	.45		.45	
NEW YORK (Bayonne, N. J.)—				
28 plus (G.O.)	.03½	.04	.03½	.04
*28-30 Diesel	1.30		1.30	
†Bunker C	.60		.60	

*Lighterage 6½ cents per barrel.
†Lighterage 5 cents per barrel.

PETROLEUM COKE*

Prices per ton f.o.b. refineries in Chicago area.

	Mar. 15		Mar. 8	
Breeze (screenings)	3.75		3.75	
Still runs	4.75		4.75	
Lump and egg	7.00	7.50	7.00	7.50

*Refiners will absorb freight up to 80 cents a ton.

NEUTRAL OILS

(Viscosity at 100° F., and Color)

OKLAHOMA (Group 3)—	Mar. 15		Mar. 8	
Zero to 10 Cold Test:				
150-3	.06¼	.06½	.06¼	.06½
180-3	.07½	.07⅝	.07½	.07⅝
180-4	.07	.07¼	.07	.07¼
200-3	.08½		.08½	
200-4	.08	.08¼	.08	.08¼
240-3	.09¾	.10	.09¾	.10
240-4	.09¼	.09½	.09¼	.09½
280-3	.11¼	.11½	.11¼	.11½
280-4	.10¼	.10½	.10¼	.10½
300-3.5	.11⅞	.12	.11¾	.12
350-3.5	.12¼	.12½	.12¼	.12½
400-4	.12¾	.13	.12¾	.13
500-4.5	.13¼	.13½	.13¼	.13½
100-2 Paraffin Oil	.04¼	.04½	.04¼	.04½
15-30 Cold Test:				
200-3	.07¾	.08	.07¾	.08
200-4	.07½	.07¾	.07½	.07¾
240-3	.09¼	.09½	.09¼	.09½
240-4	.08¾	.09	.08¾	.09
280-3	.10¾	.11	.10¾	.11
280-4	.09¾	.10	.09¾	.10
PENNSYLVANIA—				
Viscosity at 70° F., and Color:				
150-3	.14	.14½	.14	.14½
180-3	.16½	.18	.16½	.17½
200-3	.18½	.20½	.18½	.19½
220-3	.22	.23	.22	.23
36 Miners Neutral	.05½		.05½	
34 Neutral	.05½		.05½	
34 Sundebloom Neutral	.05		.05	
GULF COAST—				
Pale Oils:				
100-2-2½	.04½	.05	.04½	.05
200-3	.06	.06¼	.06	.06¼
300-3	.06½	.07	.06½	.07
500-3½	.08	.08½	.08	.08½
750-3½	.09	.09½	.09	.09½
1,200-3½	.10½	.11	.10½	.11
2,000-4	.12	.12½	.12	.12½
Red Oils:				
200-5-6	.05	.05½	.05	.05½
300-5-6	.05½	.06	.05½	.06
500-5-6	.06¾	.07	.06¾	.07
1,200-5-6	.09½	.10	.09½	.10
2,000-6 plus	.11	.11½	.11	.11½
CALIFORNIA—				
Pale Oils:				
100-2½-3	.08	.08¼	.08	.08¼
200-2½-3	.08	.08¼	.08	.08¼
300-3-3½	.08½	.08¾	.08½	.08¾
350-3-4	.09	.09¼	.09	.09¼
400-3-4	.09½	.09¾	.09½	.09¾
350-3-4	.10	.10¼	.10	.10¼
550-3-4	.10½	.11	.10½	.11
Red Oils:				
200-4½-5	.08	.08¼	.08	.08¼
300-5-6	.08½	.08¾	.08½	.08¾
350-5-6	.09	.09¼	.09	.09¼
400-5-6	.09½	.09¾	.09½	.09¾
450-5-6	.10	.10¼	.10	.10¼

REFINERY AND CRUDE PRICES

Quotations on refined products are for interstate or export movement unless otherwise noted.

500-5-6	.10½	.11	.10½	.11
600-5-6½	.11½	.12	.11½	.12
700-6½ plus	.12½	.12¾	.12½	.12¾
750-6½ plus	.13	.13½	.13	.13½
900-6½ plus	.14½	.14¾	.14½	.14¾
NEW YORK (Bayonne, N. J.)—				
Paraffin Oil:				
25 pale	.10¼		.10¼	
28 pale	.07¼		.07¼	
280 red	.12½		.12½	
250 red	.11½		.11½	
225 red	.10		.10	
200 red	.09¼		.09¼	

BRIGHT STOCKS AND STEAM REFINED STOCKS

OKLAHOMA (Group 3)—	Mar. 15		Mar. 8	
600 light green S.R.	.04	.06	.04	.06
600 dark green S.R.	.03	.04½	.03	.04½
Bright Stock:				
190-200 D	.17½	.18	.17½	.18
150-160 D, 0-10	.15½	.16	.15½	.16
150-160 D, 10-25	.15	.15½	.15	.15½
150-160 D, 25-40	.14½	.15	.14½	.15
150-160 E	.14¾	.15	.14¾	.15
PENNSYLVANIA—				
600 S.R.	.13½		.13½	
650 S.R.	.15½	.15¾	.15½	.15¾
600 Pennsylvania flash	.16½	.16¾	.16½	.16¾
600 D filtered	.20	.20½	.20	.20½
600 E filtered	.15¾	.16	.15¾	.16
Pennsylvania Grade Bright Stock:				
10-15 pour test	.25		.25	
25-30 pour test	.22	.23	.22	.23
35 and above	.22		.22	

WAX AND PETROLATUM

(Prices per pound)

OKLAHOMA (Group 3)—	Mar. 15	Mar. 8
124-126 white crude scale	.01¾	0.1¾
PENNSYLVANIA—		
122-124	.0205	.0205
124-126	.0205	.0205
NEW YORK (Bayonne, N. J.)—		
Refined Wax:		
120-122	.02⅞	.02⅝
125-127	.03⅛	.02⅞
130-132	.03⅝	.03⅝
133-135	.04⅛	.04
135-137	.04¼	.04⅛
Petrolatum in barrels in carload lots:		
Dark green	.01¾	.01¾
Amber	.02⅛	.02⅛
Extra amber	.02⅝	.02⅝
Cream	.04¾	.04¾
Lily white	.05¾	.05¾
Snow white	.06¾	.06¾

EXPORT PRICES

GASOLINE

GULF COAST—	Mar. 15		Mar. 8	
U. S. Motor	.04½	.04¼	.04½	.04¼
60-62 400	.04⅜		.04⅜	
61-63 390	.04⅜		.04⅜	
64-66 375	.04⅜	.04½	.04⅜	.04½
LOS ANGELES, CALIF.—				
U. S. Motor, 53-55 437 e.p.	.03¾	.04¼	.03¾	.04¼
U. S. Motor, 65 octane num.	.05		.05	
U. S. Motor, 67 octane num.	.05¼		.05¼	
U. S. Motor, 69 octane num.	.05½		.05½	
58-62 400 endpoint gasoline	.04¼	.04¾	.04¼	.04¾

KEROSENE

GULF COAST—				
41-43 prime white	.04¼		.04¼	
41 water white	.04		.04	
LOS ANGELES, CALIF.—				
41-43 water white	.04	.04¾	.04	.04¾

LUBRICANTS

NEW YORK (Bayonne, N. J.)—				
600, steam refined cylinder stocks, in bbls.	.20	.21	.19	.20
650, steam refined	.22½	.23	.22½	.23
600, Pennsylvania flash	.24	.25	.23	.24
630, Pennsylvania flash	.27	.28	.26	.27
600, Warren E	.22½	.23	.22½	.23
600, Oil City E	.21½	.22	.21½	.22
Light 140-150 Bright Stocks	.29	.30	.28	.29
Dark 140-150 Bright Stocks	.28	.29	.27	.28

CALIFORNIA CRUDE OIL PRICES

STANDARD OIL CO. OF CALIFORNIA

For its current purchases of crude oil at the well (unless otherwise specified) for allowable crude oil produced in accordance with allocations made by the California Statewide Curtailment Committee. All gravities above those quoted take highest price offered in that field. Effective June 19, 1931, at 7 a.m.

Gravity	Signal Hill	Seal Beach, Alamitos Heights	Huntington Beach	Inglewood	Olinda-Brea, Canon	Torrance	Richfield	Coyote Hills	Santa Fe Springs	Midway-Sunset, Elk Hills Buena Vista Hills	Lost Hills
14-14.9	$.65	$.65	$.65	$.65	$.65	$.65	$.65	$.65	...	$.55	$.55
15-15.9	.65	.65	.65	.65	.65	.65	.65	.65	...	.55	.55
16-16.9	.65	.65	.65	.65	.65	.65	.65	.65	...	.55	.55
17-17.9	.65	.65	.65	.65	.65	.65	.65	.65	...	.55	.55
18-18.9	.65	.65	.65	.65	.65	.65	.65	.65	...	.55	.55
19-19.9	.65	.65	.65	.65	.65	.65	.65	.65	...	.55	.55
20-20.9	.65	.65	.65	.66	.66	.65	.65	.65	...	.55	.55
21-21.9	.65	.65	.65	.68	.67	.65	.66	.65	...	.55	.57
22-22.9	.65	.65	.66	.70	.68	.66	.68	.65	...	.56	.59
23-23.9	.67	.67	.68	.72	.70	.67	.70	.66	...	.58	.60
24-24.9	.69	.69	.70	.74	.72	.68	.72	.67	$.65	.61	.62
25-25.9	.71	.71	.72	.76	.74	.70	.74	.69	.65	.64	.64
26-26.9	.73	.73	.74	...	.76	...	...	.71	.65	.66	.65
27-27.9	.75	.75	.76	...	.78	...	...	.73	.68	.68	.67
28-28.9	.77	...	...	...	.80	...	...	.75	.71	.71	.69
29-29.9	.79	...	...	...	...	...	...	.77	.73	.74	.71
30-30.9	.81	...	...	...	...	...	...	.79	.75	.76	.72
31-31.9	...	...	...	...	...	...	...	...	.78	...	...
32-32.9	...	...	...	...	...	...	...	...	.80	...	...
33-33.9	...	...	...	...	...	...	...	...	.83	...	...
34-34.9	...	...	...	...	...	...	...	...	.85	...	...
35-35.9	...	...	...	...	...	...	...	...	.87	...	...

Standard Oil Co. of California prices in other fields:

(Continued on Page 84)

CRUDE OIL PRICES

OKLAHOMA, KANSAS, NORTH AND EAST CENTRAL TEXAS

East Texas (Nov. 2, 1931)† ..... $ .83
Corsicana heavy (Nov. 2, 1931)* ..... .49
Other fields..... See gravity table
†Posted by Panola Pipe Line Co., Magnolia Petroleum Co., Tidal Refining Co., Sinclair Refining Co., Gulf Pipe Line Co., Atlas Pipe Line Co. *Magnolia Petroleum Co.

EASTERN STATES

Joseph Seep Purchasing Agency
(Effective December 16, 1931)

Pennsylvania Grade Oil in National Transit Lines (Bradford Field) (Mar. 14, 1932) $1.82
Pennsylvania Grade Oil in Southwest Pennsylvania Lines 1.55
Penna Grade Oil in Eureka Pipe Line Lines (West Virginia) (Feb. 26, 1932) 1.50
Penna Grade Oil in Buckeye Pipe Line Lines (Mar. 12, 1932) 1.36
Corning Grade Oil in Buckeye Pipe Line Co.'s line (Nov. 9, 1931) ..... .85
Ragland Grade Oil in Cumberland Pipe Lines (Kentucky) (Jan. 10, 1931) .... .60
Wayne district Oil in Cumberland Pipe Lines (April 23, 1931) 1.17

Tide Water Pipe Co.
(Effective March 14, 1932)

Bradford, Pa. $1.82
Allegany, N. Y. 1.82

Pure Oil Co.
(Effective December 16, 1931)

Cabin Creek, W. Va. $1.45
Bradford Hollow, W. Va. 1.45
Kelly's Creek, W. Va. 1.45

Pennzoil Co.
(Effective March 14, 1932)

Pennsylvania Grade Oil in National Transit Lines:
Group A $1.77
Includes Cochran, Franklin, Hamilton and Doolittle districts.
Group B 1.76
Includes Titusville district.
Group C 1.75
Includes Turkey and Tidiout districts.
Group D 1.74
Includes Bear Creek and Porkey districts.
Group E 1.73
Includes Eldenna, Bull Creek, Rough Run, Carbon, Dipner, Bredin, McJunkin, Jameson, Kennerdell, Emlenton, Tiona, Lacy and Kinzua districts.
Price depends on length of pipe line haul to plant at Oil City.

TEXAS PANHANDLE

Gray County, Wheeler County and Carson-Hutchison Counties..... See gravity table

ROCKY MOUNTAIN STATES

Ohio Oil Co.-Midwest Refining Co.

Ilea, light (Aug. 24, 1931)	$ .75
Ilea, heavy (Aug. 24, 1931)	.53
Fort Collins (Nov. 3, 1931)	.71
Florence (Nov. 2, 1931)	.65
Wellington (Nov. 3, 1931)	.61
Dutton Creek (Nov. 3, 1931)	.75
Rock Creek, Wyo. (Nov. 3, 1931)	.85
Frannie, light (Nov. 3, 1931)	.61
Frannie, heavy (Nov. 3, 1931)	.51
Salt Creek..... Mid-Continent gravity table	
Big Muddy (Nov. 3, 1931)	.83
Grass Creek (Nov. 3, 1931)	1.05
Elk Basin (Nov. 3, 1931)	1.05
Lance Creek (Aug. 24, 1931)	1.05
Poison Spider (Mar. 5, 1931)	.70
Notches (Mar. 14, 1927)	.65
Hudson (June 2, 1931)	.65
Lander (Mar. 5, 1931)	.40
Rex Lake (Feb. 22, 1930)	1.10
Osage (Apr. 15, 1931)	.98
Lost Soldier (Nov. 3, 1931)	.69
Hamilton Dome (Nov. 3, 1931)	.45
Greybull (Nov. 3, 1931)	1.05
Cat Creek (Nov. 3, 1931)	1.05
Pondera (Nov. 3, 1931)	.90
Sunburst, Mont. (Nov. 3, 1931)	1.00
Hogback, N. Mex. (Aug. 24, 1931)	.80
Lea County, N. Mex. (Nov. 3, 1931)	.50
Border, Mont.	1.55
Red Coulee, Alberta	1.55
Dry Creek, Mont. (Aug. 24, 1931)	1.00
Maljamar (Aug. 22, 1931)	1.00
Artesia-Jackson (Nov. 3, 1931)	.50

Note—Salt Creek, Cat Creek, Dry Creek, Dallas-Derby, Hudson, Greybull and Hogback posted by Midwest Refining Co. and remainder by Ohio Oil Co. Both companies posted Grass Creek light and Elk Basin. Lost Soldier posted by Producers & Refiners Corp. Artesia, Jackson and Maljamar posted by Continental Oil Co. Border and Red Coulee posted by Imperial Refining Co. Lea County posted by Humble Oil & Refining Co. Fort Collins, Wellington, Orchard, Florence, Rattlesnake and Table Mesa by Continental Oil Co. Osage posted by Arro Oil & Refining Co.

(Continued on Page 78)

CRUDE OIL GRAVITY TABLE

Gravity	Kansas and Oklahoma 1	North and Central Texas 2	East Central Texas 3	Gray County, Texas 4	Carson and Hutchinson Counties, Texas 5	Salt Creek, Wyo. 6	North Louisiana and Arkansas 7	Gulf Coast (Tex. and La.) 8	Cameron Meadows, La. 9
Below 25 degrees	...	...	...	...	...	...	...	$.70	$.60
25-25.9 degrees	...	...	...	...	...	...	...	.71	.60
26-26.9 degrees	...	...	...	...	...	...	...	.72	.61
27-27.9 degrees	...	...	...	...	...	...	...	.73	.62
28-28.9 degrees	...	...	...	...	...	...	...	.74	.63
Below 29 degrees	$.61	$.61	$.61	...	...	$.61	$.61	...	...
29-29.9 degrees	.63	.63	.63	...	...	.63	.63	.75	.64
30-30.9 degrees	.65	.65	.65	...	...	.65	.65	.76	.65
31-31.9 degrees	.67	.67	.67	...	...	.67	.67	.77	.66
32-32.9 degrees	.69	.69	.69	...	...	.69	.69	.78	.67
33-33.9 degrees	.71	.71	.71	...	...	.71	.71	.79	.68
34-34.9 degrees	.73	.73	.73	$.61	$.56	.73	.73	.80	.69
35-35.9 degrees	.75	.75	.75	.63	.58	.75	.75	.81	.70
36-36.9 degrees	.77	.77	.77	.65	.60	.77	.77	.82	.71
37-37.9 degrees	.79	.79	.79	.67	.62	.79	.79	.83	.72
38-38.9 degrees	.81	.81	.81	.69	.64	.79	.81	.84	.73
39-39.9 degrees	.83	.83	.83	.71	.66	.79	.83	.85	.74
40 degrees and over	.85	.85	.85	.73	.68	.79	.85	.86	.75

Column 1—Led by Continental Oil Co. effective November 2, 1931, and adopted on same day by other companies excepting Magnolia Petroleum Co. and White Eagle Oil Corp. and excepting that Carter Oil Co., Gypsy Oil Co. and Pure Oil Co. started their schedule at below 25 degrees, 53 cents; 25 degrees, 55 cents; with 2 cents added for each degree upward to 40 degrees and above at 85 cents. Magnolia Petroleum Co. adopted the price schedule in Oklahoma on January 8, 1932, and the White Eagle Oil Corp. in Kansas on January 1, 1932, on oil from 29 degrees upward, but posted 52 cents for oil below 28 gravity and 54 cents for 28 gravity.

Column 2—Led by Continental Oil Co. effective November 2, 1931, and followed by other purchasers on same day excepting Magnolia Petroleum Co. which met the prices on January 8, 1932, from 29 degrees upward, posting 52 cents for oil below 28 degrees and 54 cents for 28 gravity oil.

Column 3—Humble Oil & Refining Co. on November 2, and by other buyers excepting Magnolia Petroleum Co., which met the prices from 29 degrees upward on January 8, 1932, but posted 52 cents for oil below 28 degrees and 54 cents for 28 gravity oil.

Column 4—Led by The Texas Company, November 2, followed by Humble Oil & Refining Co., Gulf Pipe Line Co. and H. F. Wilcox Oil & Gas Co. same day. Magnolia Petroleum Co., January 8, 1932.

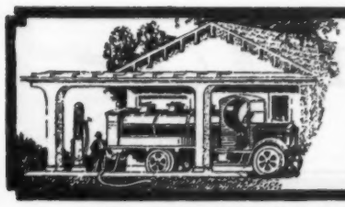
Column 5—Led by The Texas Company, November 2, followed on same day by Humble Oil & Refining Co. and Gulf Pipe Line Co. Magnolia Petroleum Co., January 8, 1932.

Column 6—Midwest Refining Co., November 2.

Column 7—Standard Oil Co. of Louisiana, November 4, 1931; The Texas Company, Gulf Refining Co. and Louisiana Oil Refining Co. same day. Magnolia Petroleum Co., January 8, 1932.

Column 8—Led by The Texas Company, November 2, followed on same day by Humble Oil & Refining Co., Magnolia Petroleum Co., Gulf Pipe Line Co. and Sun Oil Co., but two last named companies' schedules stop at 35 degrees and above at 81 cents, and the Sinclair Refining Co., but latter company's schedule stops at 31 degrees and above at 71 cents. Magnolia Petroleum Co. applied this schedule to Lockport and Iowa, La.

Column 9—Magnolia Petroleum Co., January 8, 1932.



TANK WAGON MARKETS

Tank wagon quotations for gasoline and kerosene in United States as furnished by the larger marketing concerns March 15.

ALL TANK WAGON AND SERVICE STATION QUOTATIONS INCLUDE TAXES

STANDARD OIL CO. (INDIANA)

	Gasoline Tank wagon	Gasoline Service station	Incl'ds tax of	Kero. tank wagon
Chicago	15.0	15.0	3.0	9.0
Decatur, Ill.	15.5	15.5	3.0	9.1
E. St. Louis	14.8	14.8	3.0	8.3
Joliet	15.5	15.5	3.0	9.1
Peoria	15.5	15.5	3.0	9.1
Quincy	15.3	15.3	3.0	8.9
Davenport, Ia.	15.6	15.6	3.0	9.4
Des Moines	15.6	15.6	3.0	8.1
Keokuk	15.6	15.6	3.0	6.4
Sioux City	15.2	15.2	3.0	9.0
Duluth, Minn.	16.6	16.6	3.0	10.0
Mankato	16.2	16.2	3.0	8.1
Minneapolis	16.3	16.3	3.0	10.0
LaCrosse, Wis.	17.3	17.3	4.0	10.1
Milwaukee	16.3	16.3	4.0	9.0
Madison	16.4	16.4	4.0	9.2
Detroit, Mich.	14.5	14.5	3.0	9.1
Grand Rapids	14.8	14.8	3.0	10.7
Saginaw	13.2	13.2	3.0	10.5
Evansville, Ind.	16.2	15.6	4.0	10.0
Indianapolis	16.4	16.4	4.0	10.2
South Bend	16.5	16.5	4.0	8.1
Fargo, N. D.	18.0	18.0	3.0	12.0
Huron, S. D.	17.4	16.0	4.0	10.8
Sioux Falls	16.9	16.9	4.0	10.5
K. C., Mo.	15.0	15.0	3.0	7.9
Springfield*	15.0	15.0	3.0	7.0
St. Louis*	14.0	14.0	3.0	8.4
St. Joseph	14.6	14.6	3.0	7.6
Wichita, Kans.	13.9	13.9	3.0	6.1
Bartlesville, Ok.	13.1	15.1	4.0	7.1

*State tax 2 cents, remainder city tax.

A third grade of gasoline, "Stanolind Blue," is sold at all major points at a price 1½ cents or more below the price on the regular grade.

Effective November 4—New dump discount applicable on all grades of gasoline sold from tank wagon. Any tank wagon customer buying 25 gallons or more at one time will be given 1-cent discount per gallon off tank wagon price at time of delivery. Customers not under contract receive no other discount.

Effective January 1—Discounts on Q.D.A. on 500 gallons or more per month throughout territory; Red Crown Ethyl Gasoline, 3 cents off tank wagon price; Red Crown gasoline, 2½ cents off tank wagon price; Stanolind Blue gasoline, 1 cent off tank wagon price. On deliveries of 75,000 gallons or more each classification allowed 1 cent additional discount.

Discounts on resellers authorized agent's agreement: Same amounts as above except made off service station price instead of tank wagon price.

SOUTHWESTERN DISTRICT

Magnolia Petroleum Co.

	Gasoline Tank wagon	Gasoline Service station	Incl'ds tax of	Kero. tank wagon
Dallas, Tex.	15.0	16.0	4.0	9.00
Fort Worth	15.0	16.0	4.0	8.0
Houston	12.0	15.0	4.0	9.0
San Anotnio	14.0	16.0	4.0	8.0
El Paso	12.0	14.0	4.0	11.0
Texarkana	*16.0	16.0	4.0	9.0
Muskogee, Ok.	11.0	13.0	4.0	7.0
Okla. City	13.0	15.0	4.0	7.0
Tulsa	13.0	15.0	4.0	8.0
Ft. Smith, Ark.	*16.5	16.5	5.0	*11.0
Little Rock	*17.5	17.5	6.0	*11.0

One-cent rebate made from posted station prices to cash purchasers in Louisiana, Arkansas and Tennessee.

*Less 2 cents to dealers.

ROCKY MOUNTAIN DISTRICT

Continental Oil Co.

	Gasoline Tank wagon	Gasoline Service station	Incl'ds tax of	Kero. tank wagon
Denver, Colo.	14.0	17.0	4.0	13.5
Pueblo	14.0	17.0	4.0	12.0
Grand Jctn.	18.0	21.0	4.0	14.5
Casper, Wyo.	15.0	18.0	4.0	10.0
Cheyenne	13.0	16.0	4.0	11.5
Butte, Mont.	17.0	20.0	5.0	16.0
Billings	16.0	21.0	5.0	14.5
Great Falls	21.0	23.0	5.0	16.0
Helena	28.0	23.0	5.0	16.0
Salt Lake, Utah	17.5	20.5	4.0	16.0
Albu'que, N. M.	17.0	20.0	6.0	14.0
Boise, Idaho	21.0	24.0	5.0	18.0
Twin Falls*	21.0	24.0	5.0	18.0

*2½-cent discount off tank wagon to dealers.

OHIO

Standard Oil Co. (Ohio)

	Gasoline Tank wagon	Gasoline Service station	Incl'ds tax of	Kero. tank wagon
Ohio points	15.5	16.0	4.0	*12.0

Dealers and commercial accounts 2 cents under tank wagon.

*Service station price 13 cents.

PENNSYLVANIA-DELAWARE AND PART OF NEW ENGLAND

Atlantic Refining Co.

	Gasoline Tank wagon	Gasoline Service station	Incl'ds tax of	Kero. tank wagon
Pittsburgh, Pa.	15.0	16.0	3.0	11.0
Philadelphia	14.0	15.0	3.0	11.0
Scranton	15.0	16.0	3.0	11.0
Allentown	15.0	16.0	3.0	11.0
Altoona	15.0	16.0	3.0	11.0
Erie	15.0	16.0	3.0	11.0
Dover, Del.	15.0	16.0	3.0	11.0
Wilmington	15.0	16.0	3.0	11.0
Springf'd, Mass.	15.5	16.5	3.0	8.5
Worcester	15.3	16.3	3.0	8.5
Boston	14.5	15.5	3.0	9.5
Providence, R.I.	13.5	14.5	2.0	8.5
Hartford, Conn.	14.5	15.5	2.0	10.0
New Haven	14.6	15.6	2.0	10.0

SOUTHERN DISTRICT

Standard Oil Co. (Kentucky)

	Gasoline Tank wagon	Gasoline Service station	Incl'ds tax of	Kero. tank wagon
Atlanta, Ga.*	19.5	19.5	6.0	9.0
Augusta	20.0	21.0	6.0	14.0
Macon	20.0	20.0	6.0	12.0
Savannah	19.0	19.0	6.0	11.0
Birm'ham, Ala.	20.5	20.5	6.0	12.0
Mobile	20.0	20.0	5.0	10.0
Montgomery	21.5	21.5	6.0	13.5
Jackson, Miss.	16.0	17.0	5.5	10.0
Vicksburg	18.0	16.5	5.5	8.0
Jack'ville, Fla.	19.0	20.0	7.0	11.0
Miami	21.0	22.0	7.0	13.0
Pensacola	20.0	20.0	7.0	13.0
Tampa	19.0	20.0	7.0	14.0
Lexington, Ky.	17.0	18.0	5.0	10.0
Covington	16.0	17.0	5.0	10.0
Louisville	15.0	16.0	5.0	10.0
Corbin	18.0	19.0	5.0	15.0

A third grade "Kyso Green" is sold at a price generally 2 cents below the price on the regular grade.

In addition to the state tax of 4 cents on gasoline, Montgomery has city and county tax of 2 cents on gasoline and one-half cent on kerosene. Kerosene prices in Georgia include 1-cent tax. In Florida, an inspection fee of 0.125 cent; in Alabama, an inspection fee of one-half cent on kerosene and one-fourth cent on gasoline. To Pensacola, Montgomery and Birmingham state taxes add 1-cent levy tax. To Gulfport state tax add privilege tax of 2 cents. To Mobile state tax add 1-cent city tax and 2½ cents county tax.

Effective April 2 price to dealers 2 cents under posted tank wagon price.

*An additional discount of 1 cent is offered to dealers effective October 6.

ATLANTIC COAST DISTRICT

Standard Oil Co. (New Jersey)

	Gasoline Tank wagon	Gasoline Service station	Incl'ds tax of	Kero. tank wagon
Atl'tic City, N.J.	15.7	16.2	3.0	11.5
Newark	14.7	15.2	3.0	8.5
Annapolis, Md.	16.2	16.7	4.0	10.0
Baltimore	15.4	15.9	4.0	8.0
Cumberland	17.2	17.7	4.0	12.0
Wash'g'n, D. C.	13.9	14.4	2.0	10.0
Danville, Va.	18.0	18.5	5.0	11.5
Norfolk	16.5	17.0	5.0	10.5
Petersburg	17.5	18.0	5.0	11.5
Richmond	16.5	17.5	5.0	10.7
Roanoke	18.2	18.7	5.0	12.0
Charles'n, W.Va.	16.7	17.2	4.0	11.5
Parkersburg	15.4	15.9	4.0	10.3
Wheeling	16.6	17.1	4.0	11.4
Charlotte, N. C.	19.0	19.0	6.0	10.7
Hickory	19.5	20.3	6.0	12.6
Mt. Airy	19.7	20.2	6.0	12.5
Raleigh	19.4	19.9	6.0	12.3
Salisbury	18.0	18.5	6.0	12.5
Charleston, S.C.	17.5	18.0	6.0	10.3
Columbia	19.4	19.9	6.0	12.3
Spartanburg	19.7	20.2	6.0	13.5

Two and one-half cents per gallon discount off tank wagon price of gasoline to dealers except Washington, D. C., and States of Maryland and New Jersey, where discount is 2½ cents.

Prices shown above are for standard gasoline.

NEW YORK AND PART OF NEW ENGLAND DISTRICT

Standard Oil Co. (New York)

	Gasoline Tank wagon	Gasoline Service station	Incl'ds tax of	Kero. tank wagon
Albany, N. Y.	16.6	17.6	2.0	15.6
New York*	12.3	14.3	2.0	14.3
Buffalo	15.8	15.8	2.0	14.8
Rochester	16.0	16.0	2.0	14.0
Syracuse	16.8	16.8	2.0	14.8
Boston, Mass.	16.5	16.5	3.0	13.5
Augusta, Me.	19.8	18.8	4.0	14.8
Manch'tr, N. H.	18.4	18.4	4.0	14.0
Burlington, Vt.	19.3	19.3	4.0	15.3

*Prices in steel barrels.

PACIFIC COAST TERRITORY

Standard Oil Co. of California*

	Gasoline Tank truck	Gasoline Posted retail	Incl'ds tax of	Kero. tank wagon
Fresno	12.5	16.5	3.0	17.0
San Francisco	12.5	16.5	3.0	15.5
Los Angeles	12.0	16.0	3.0	15.5
Reno, Nev.	16.0	20.0	4.0	19.0
Portland, Ore.	14.0	18.0	4.0	16.5
Seattle, Wash.	15.0	19.0	5.0	16.5
Tacoma	15.0	19.0	5.0	16.5
Spokane	18.5	22.5	5.0	20.5
Phoenix, Ariz.	14.5	17.0	5.0	20.0

Above prices are at company's plant or depots as company does not operate stations. A 4-cent per gallon discount is given dealers and customers taking tank wagon lots except in Phoenix where the discount is 1 cent.

*Retail prices posted by Standard Stations, Inc., a subsidiary.

CENTRAL SOUTH DISTRICT

Standard Oil Co. (Louisiana)

	Gasoline Tank wagon	Gasoline Service station	Incl'ds tax of	Kero. tank wagon
N. Orleans, La.	16.0	16.0	6.0	†10.0
Baton Rouge	16.5	16.5	5.0	†12.0
Alexandria	16.0	16.0	6.0	†12.0
Lafayette*	17.5	17.5	6.0	†10.0
Lake Charles*	16.5	16.5	6.0	†12.0
Shreveport	14.5	14.5	5.0	†12.0
Knoxville, Tenn.	21.0	21.0	7.0	13.5
Memphis	18.5	18.5	7.0	11.0
Chattanooga	20.5	20.5	7.0	11.0
Nashville	20.0	20.0	7.0	13.5
Bristol	19.5	19.5	7.0	14.0
Lt. Rock, Ark.	17.5	17.5	6.0	11.0

*Includes city tax of 1 cent. Louisiana kerosene prices include 1-cent state tax. New Orleans kerosene price also includes 1-cent city tax.

†Kerosene prices in Louisiana include 1 cent tax except New Orleans where tax is 2 cents.

Two-cent discount off gasoline and kerosene tank wagon price to dealer and commercial accounts.

NEBRASKA

Standard Oil Co. (Nebraska)

	Gasoline Tank wagon	Gasoline Service station	Incl'ds tax of	Kero. tank wagon
Omaha	14.9	15.9	4.0	9.25
McCook	17.0	17.0	4.0	7.5
Norfolk	16.75	17.75	4.0	9.75
N. Platte	17.75	18.75	4.0	10.50
Scottsbluff	17.0	17.0	4.0	9.0

Note—Dealers' discount allowed as follows: Red Crown Ethyl, 3 cents off station price; Red Crown, 2½ cents off normal service station price; Nebraska Blue (third grade), 1 cent off normal service station price.

NAPHTHA

	Tank wagon	Tank car
Oleum spirits	10.7	6.23
V.M.P. naphtha	12.7	7.73
Cleaners' naphtha	15.2	9.23
Stanisol	15.3	9.23

Tank wagon prices f.o.b. Chicago January 6, 1932. Each of above prices subject to discount of 1 cent per gallon for 150-gallon lots if covered by contracts.

STANOLIND FURNACE OIL IN CHICAGO

Effective July 1, prices f.o.b. Chicago, tank wagon prices: 1 to 99 gallons, 8 cents; 100 gallons or more, 6 cents.

Stanolex Fuel

Effective May 9, f.o.b. Chicago, tank wagon prices: 1 to 199 gallons, 7 cents; 200 gallons or more, 5 cents. Sinclair met this by bringing down the price of its No. 3.

Fuel Oils

Chicago tank wagon prices (in lots of 400 gallons and over): 38-46 straw distillate, 6 cents; 32-36 gas oil (light nero), 5.5 cents; 33-36 gas oil (industrial), 5.25 cents; 28-30 zero fuel oil, 5 cents; 34-36 fuel oil, 4.25 cents; 18-22 fuel oil, 3.75 cents.

TANK WAGON CHANGES

Standard Oil Co. of Louisiana, effective March 7, advanced gasoline tank wagon and service station prices 1 cent at Memphis, Tenn.

Standard Oil Co. of Kentucky, effective February 29, reduced kerosene tank wagon price 1½ cents at Jackson, Miss., to 10 cents. Company, effective March 2, advanced kerosene tank wagon price

(Continued on Page 88)

CRUDE OIL PRICE CHANGES

Effective March 12 the Joseph Seep Purchasing Agency increased the price of Pennsylvania grade oil in Buckeye Pipe

(Continued on Page 88)

CRUDE OIL PRICES

(Continued from Page 77)

WEST TEXAS

Iatan and Westbrook..Same as North Texas	
Crane, Upton, Crockett, Howard, Glasscock, Ector, Winkler and Pecos Counties*	$ .50
Lea County, N. Mex.‡	.50
Toborg, Pecos County, Aug. 25, 1931†	.35

*The Texas Company, November 2, 1931; Magnolia Petroleum Co., Humble Oil & Refining Co., Gulf Pipe Line Co., same day. †Shell Petroleum Corp. ‡Humble Oil & Refining Co., The Texas Company, November 2, 1931.

GULF COAST

Grade A and Grade B classifications discontinued by leading buyers.	
	See gravity table
Jennings, La. (Nov. 2, 1931)*	$ .65
Lockport, La. (Aug. 27, 1931)†	
	See Gulf Coast gravity table
Refugio, light	See gravity table
Refugio, heavy (Nov. 2, 1931)‡	.75
Markham (Nov. 3, 1931)§	.67
High Island (Nov. 2, 1931)¶	.65

*Gulf Refining Co. †Magnolia Petroleum Co. ‡Humble Oil & Refining Co. §The Texas Company. ¶Gulf Pipe Line Co.

NORTH LOUISIANA AND ARKANSAS

Smackover, Ark. (all grades) (Nov. 4, 1931)	$ .55
Urbana, Ark.	See note below
Bellevue, La. (June 3, 1931)	.25
Urania, La. (Nov. 2, 1931)	.50
Calion, Ark. (Aug. 22, 1931)	.52
East El Dorado, Ark. (Nov. 4, 1931)	.55
Stephens, Ark., below 29° (Aug. 24, 1931)	.41
Stephens, Ark., 29° and above (Aug. 24, 1931)	.44
Other fields	See gravity table

Note—Smackover, all grades, Standard Oil Co. of Louisiana, The Texas Company, Gulf Refining Co., Magnolia Petroleum Co., Bellevue posted by Magnolia Petroleum Co.; Urania by H. L. Hunt, Inc., and Louisiana Oil Refining Co.; Calion by Gulf Refining Co.; East El Dorado by Gulf Refining Co. and Magnolia Petroleum Co.; Stephens, Ark., by Louisiana Oil Refining Co. and Atlantic Oil Producing Co.

SOUTH CENTRAL AND SOUTHWEST TEXAS

Darst Creek (Nov. 3, 1931)‡	$ .60
Luling (Nov. 2, 1931)†	.60
Mirando (Nov. 2, 1931)†	.75
Pettus (Nov. 2, 1931)*	.85
Salt Flat (Nov. 2, 1931)*	.60
Thrall§	
Lytton Springs (Lockhart)	See gravity table
Dobrowolski§	
Same as Mid-Continent gravity scale up to and including 38-38.9°.	
Somerset¶	
Same as Mid-Continent gravity scale up to and including 38-38.9°.	

‡The Texas Company. *Humble Oil & Refining. †Magnolia Petroleum Co. §Thrall prices same as North Central Texas less 19½ cents per cwt. freight. ¶Grayburg Oil & Refining Co., Pioneer Oil & Refining Co. and Texas Petroleum Products. ‖Pioneer Oil & Refining Co.

MIDDLE WESTERN STATES

Ohio Oil Co.

(Effective November 3, 1931)

Lima	$1.00
Wooster	1.15
Illinois	.95
Indiana	.60
Princeton	.95
Plymouth	Shut in
Western Kentucky	.90
Midland, Mich. (Oct. 9, 1931)*	.55
Dundee, Mich.†	
Same as Stanolind Crude Oil Purchasing Co.'s Mid-Continent gravity scale	
Upper and Lower Traverse Sands, Mich.†	
Same as Mid-Continent gravity scale	
Somerset, Ky. (Nov. 4, 1931)	.30
Hart County, Ky. (Jan. 18, 1932)‡	.60

*Posted by Pure Oil Co. †Posted by Standard of Indiana for boat shipment. ‡Posted by Stoll Refining Co. Somerset, Ky., crude purchased by Ashland Refining Co., Ashland, Ky., and delivered through own pipe line.

MEXICO

Panuco*	$ .65

*F.o.b. ship, based on February transactions and exclusive of production and export taxes and bar dues.

CANADA

Ontario (Nov. 3, 1931):	
Petrolia*	$1.90
Oil Springs*	1.97
Alberta (Aug. 24, 1931):	
Turner Valley†:	
Crude oil 45-45.9	2.02
Crude oil 50 and above	2.05
Crude naphtha	3.12
Discolored naphtha	2.83

*Imperial Oil, Ltd. †Imperial Oil, Ltd., and Regal Oil & Refining Co.

Of Interest to Sales Departments

Imperial Official Explains Canadian Market Situation

CHATHAM, Ontario, Mar. 12.—The investigation of the gasoline industry in Canada by the Banking and Commerce Committee of the House of Commons resumed on March 8, when Victor Ross, vice president of Imperial Oil, Ltd., was the first witness called for the refining companies.

In his testimony Mr. Ross called attention to the fact that the fuel testing branch of the federal department of mines had found Canadian gasoline almost invariably of superior quality to United States gasoline. This had a bearing on higher Canadian prices. The rate of exchange was another factor. Of more importance was the length of freight haul. Gasoline was cheapest in Texas, and it followed that the farther away from the producing fields, the more expensive it became.

Mr. Ross stated that the very low price of gasoline in the United States was caused by overproduction of crude oil and of gasoline; the trouble being very similar to that experienced by Brasil with coffee. Gasoline companies in the United States were also fighting one of the biggest "bootlegging rackets" in the world. The huge amount of gasoline sold in the United States with evasion of the state tax had played a great part in the reduction of the price of the legal gasoline. Mr. Ross cited great companies that were actually losing money through having to compete with huge quantities of illegal low-priced gas.

The depressed prices were forcing many companies out of business, and it had been found that the higher the tax the less revenue it obtained. There was, however, comparatively little tax evasion in Canada and the tax was efficiently collected there.

Mr. Ross pointed out that in 1925 Hon. G. Howard Ferguson, premier of Ontario, has investigated gasoline prices in that province and had found that Imperial Oil, Ltd., was making only 8 per cent. Under present conditions, Imperial Oil, Ltd., had not earned its dividends in the past two years, and would not this year.

In reference to a suggestion that the large refining companies fixed the Canadian price, Mr. Ross stated that this was not done, but that Imperial Oil, Ltd., frequently set a price and other companies followed suit. He pointed out that the cost of distribution in Canada was much higher than in the United States owing to the sparser population and the long hauls necessary. Closing down of some wells in Turner Valley had been due to excessive freight rates which made it unprofitable to transport the crude naphtha long distances. Mr. Ross undertook to file statements showing the capital structure of the company and other details.

RUMANIAN GASOLINE ARRIVES

BALTIMORE, Md., Mar. 14.—Carrying a cargo of approximately 3,000,000 gallons of Rumanian gasoline, the tanker "Raila" arrived in Baltimore last week and immediately started discharging her cargo. The cargo, like previous shipments, is consigned to the Sunny Service Oil Co., Detroit, Mich., and will be shipped to Detroit from Baltimore by tank car. Later deliveries on the Sunny Service contract after the St. Lawrence is reopened for navigation are expected to go to Montreal for shipment to Detroit by small tankers.

LIKELIHOOD OF IMPORT DUTY ON OIL REVIVES TANKER OPERATIONS

NEW YORK, Mar. 14.—Likelihood of an import duty of at least 1 cent per gallon on crude petroleum and refined products has created activity in importing and brought about the most important revival in tanker operations for many months. Several large American companies with important production in Mexico and South America have not only put their entire tanker fleets in the Tampico and Venezuela runs, but have entered the open market and completed short-term charters for all available tonnage.

One of the major companies is reported to have brought many of its tankers from European service into the South American and Mexican run while another large company is reported to have borrowed eight large motor tankers from one of its foreign subsidiaries under an intercompany agreement. While fixtures in the open tanker market indicate only about 15 or 20 boats going into the crude moving service, it is estimated that between 40 and 50 large tankers are now engaged in the movement of South American and Mexican crude oil and refined products to the United States, principally to Atlantic Coast ports north of Hatteras.

Although the importing companies decline to comment on the situation, it is generally believed here that April 20 will be the deadline on duty-free imports, and every effort is being made to bring as much foreign oil as possible into the country before that time. It is indicated that major interests will fill all of their available storage with crude petroleum and refined products from South America and Mexico prior to the effective date of import duty, if the tariff is enacted.

Reports indicate that Trinidad and St. Thomas will forge rapidly to the front as bunkering ports in the event that the domestic bunker oil market advances through the influence of the proposed tariffs. Both Trinidad and St. Thomas are handy to vessels on the South American run.

SCHLEES NOW WITH LINCOLN

DETROIT, Mich., Mar. 14.—The four Schlee Brothers, formerly owners and operators of the Wayco Oil Corp., have completed arrangements to join forces with the Lincoln Oil Co. Four years ago the brothers sold the Wayco Oil Corp. to the Paragon Refining Co. The officers and executives of the new organization are: Charles J. Raths, president; Andrew G. Schlee, vice president and general manager; Edward F. Schlee, vice president and salesmanager; G. H. Witz, vice president and advertising manager; Dewey S. Schlee, vice president and station manager; Charles A. Raths, secretary; Gerard J. Raths, treasurer and office manager; Wilfred P. Raths, station supervisor; D. E. Vernier, plant manager; F. Horn, superintendent of transportation. Earl H. Schlee is a director.

THOMAS R. WATERBURY DIES

NEW YORK, Mar. 12.—The Texas Company headquarters here has received word of the death at Territet, Switzerland, of Thomas R. Waterbury, Continental manager of the Texas Oil Company, Ltd., for a number of years.

Mr. Waterbury, who was 41 years old, was a native of Greenwich, Conn. He was a graduate of Yale and had been a resident of England until recently. During the World War he served in the United States Navy as ensign.

PLANT IN REEVES COUNTY

The Mentone Oil & Refining Co. has been organized in Texas to build and operate a small refinery in Reeves County, Texas. The plant, which will have a capacity of 1,000 bbls. daily, is now under construction at Arno, near Odessa. The products will be sold locally.

O. H. CARLISLE IS ADVANCED

HOUSTON, Tex., Mar. 14.—O. H. Carlisle, assistant district sales manager for the Gulf Refining Co., Houston, has been advanced to district sales manager to succeed the late C. L. Kerr. H. S. Gwyn and R. A. Haralson, former assistants to Mr. Carlisle, have been made assistant district sales managers. Mr. Carlisle has been with the Gulf since 1907.

TAX EVASIONS CHECKED

HARRISBURG, Pa., Mar. 14.—Secretary of Revenue Clyde L. King states that total gallonage of taxable gasoline reported to the Bureau of Liquid Fuel Tax in January and February was 178,906,540, as contrasted with 143,520,451 gallons reported in the first two months of 1931. This is an increase of 35,386,089 gallons or 24.7 per cent. During the same two months this year the receipts from gasoline tax collections amounted to $5,285,755, while in January and February, 1931, they were $4,273,979, an increase for the two-month period this year of $1,011,775, or 23.7 per cent. The State of Pennsylvania has been aggressively attacking the problem of gasoline tax evasion, and the reports for January and February reflect the success it is achieving.

TAXATION CHANGES URGED

CHATHAM, Ontario, Mar. 14.—At a hearing held by the agriculture committee of the Alberta legislature in Edmonton, A. E. Halverson, western sales manager of Imperial Oil, Ltd., urged redefinition of gasoline to make it uniformly taxable. Gasoline or motor fuel should be any petroleum product, alone or mixed, of 45 degrees gravity and any such product that can be used in an automobile should be taxed, he said. Under present conditions in Alberta, he declared, the classification is too indefinite, taxation is being evaded and penalties are inadequate. Bonding of agents was recommended, together with increase in penalties. The use of distillates in tractors should not be interfered with, but the line between kerosene and gasoline should be more strictly defined.

BLEND ITALIAN GASOLINE

NEW YORK, Mar. 12.—The Italian government has promulgated a ruling now effective, requiring importers of motor fuel (benzina) to obtain from producers or importers a sufficient quantity of absolute alcohol for mixing with their petrol importers to produce a mixture consisting of 20 parts of alcohol by volume to 80 parts of petrol.

This action by the Italian government is along the same line as that taken in recent years by France, Germany and several other countries.

MAKE CHANGES IN McCOLL FRONTENAC SALES STAFF

CHATHAM, Ontario, Mar. 12.—Announcement has been made by J. M. Pritchard, recently appointed vice president and general sales manager of McColl-Frontenac Oil Co. of Montreal, of a number of changes in the sales staff.

F. W. Case, who has been sales manager of the central division with headquarters at Toronto, has been appointed sales manager of the eastern division with headquarters at Montreal. He will virtually take over the position previously held by Mr. Pritchard, and will have charge of sales forces in the division, which includes the island of Montreal. Mr. Case has had a lengthy experience in the oil business. In 1919 he joined Imperial Oil, Ltd., at Sarnia, later being transferred to the Toronto sales staff and subsequently to Peterboro. In 1923 he joined McColl Brothers as assistant sales manager, and in 1928 was appointed sales manager of the McColl-Frontenac central division.

Mr. Case is succeeded at Toronto by George B. McClean, previously district sales manager at Montreal with charge of all territory in the eastern division outside Montreal Island. Mr. McClean joined the British-American Oil Co. in 1915, being engaged in sales and organization in eastern Ontario; and in 1928 took charge of eastern Ontario for the McColl-Frontenac Oil Co., being transferred to Montreal in 1929.

RE-ELECT WEIHMAN HEAD OF OIL TRADES GROUP

NEW YORK, Mar. 12.—Clifford T. Weihman of Smith-Weihman Co., Inc., was re-elected president of the Oil Trades Association of New York at the annual meeting held here this week at the Waldorf-Astoria. Mr. Weihman thus starts his third term as the first president of the association to serve more than two years.

Other officers elected were as follows: Vice president, William S. Williams of the Asiatic Petroleum Corp.; secretary, Joseph C. Smith of the Smith-Weihman Co., Inc.; treasurer, Philip C. Meon, Borne-Scrymser Co.; chairman of the entertainment committee, Albert J. Squier, Warren Lubricant Co., Inc. The board of directors elected, including the foregoing, consists of George Suraud, Chelsea Oil & Supply Co.; D. T. Bloodgood, United Africa Co.; C. E. Bigelow, Sun Oil Co.; Edward Stern, Louis Stern Sons, Inc.; W. H. Correa, Standard Oil Co. of New York; J. W. Saybolt, Standard Oil Co. of New Jersey; H. M. Smith of W. R. Grace & Co.; John W. Baker, Philippine Refining Co. of New York.

ATTACK VALIDITY OF EXCLUSIVE CONTRACTS

RALEIGH, N. C., Mar. 12.—The state of North Carolina through Attorney-General Dennis G. Brummitt today instituted action against six large oil companies to restrain them from "operating under certain exclusive sales contracts now being used."

The action, Brummitt said, resulted from an investigation he made last July into the sales contracts, uncovering alleged "plans for the elimination of independent gasoline service station operators in the state."

Named in the action are the Standard Oil Co. of New Jersey, the Gulf Refining Co., The Texas Company, Sinclair Refining Co. and Shell Eastern Petroleum Products, Inc.

Increased Buying of Oil Securities

Sentiment Reported to Show Change for Better in Market. Unfavorable Earnings Thought to Have Been Discounted

By A. E. Mockler

NEW YORK, Mar. 14.—Petroleum securities came in for considerable buying support on both the Curb and the big board during the past week, and oils were in the vanguard in the general market advance. Sentiment toward the oils has shown a change for the better in financial circles, and it is evident the generally unfavorable earnings reports for 1931 have been discounted.

Phillips Petroleum

Phillips Petroleum Co. reports for 1931 net loss of $5,576,409 after taxes, interest, depreciation, depletion, intangible drilling and development costs, inventory adjustments, etc. This compares with net earnings of $3,040,630, equal to 95 cents per share on 3,213,232 average no-par shares of stock outstanding during 1930.

Earnings of Phillips Pipe Line Co. and Phillips Natural Gas Co. are not included in the 1931 report of the parent company. Phillips Natural Gas Co. has an interest in the Great Lakes Pipe Line Co.'s gasoline line from the Mid-Continent to Chicago and the Twin Cities area.

The company's report revealed that of the $20,000,000 bank credit obtained early in 1931 for building the gasoline line from Borger, Tex., to East St. Louis, Ill., $18,000,000 was expended, and that at the end of the year the credit had been reduced by payments to $12,686,402. Since January 1, 1932, further payments have reduced the obligation to $10,500,000, with arrangement made for extension.

The consolidated balance sheet shows current assets on December 31, 1931, of $24,678,756, including $5,295,611 in cash and marketable securities, and current liabilities of $18,768,209. This compares with current assets of $34,639,826, including $10,852,600 in cash and securities, at the close of the previous year.

Barnsdall Corp.

Report of Barnsdall Corp. and subsidiaries for year ended December 31, 1931, shows net loss of $3,268,637 after interest, taxes, depreciation, depletion, intangible development costs, etc. This compares with net income in 1930 of $5,130,890, equal to $2.27 a share (par $25) on 2,258,779 shares of combined Class A and B stocks outstanding at end of that year.

Current assets as of December 31, 1931, including $915,024 cash, amounted to $7,504,749 and current liabilities were $3,812,410. This compares with cash of $1,587,525, current assets of $9,196,566 and current liabilities of $4,076,085 at close of 1930. At the end of 1931 current assets totaled $7,504,749, of which $915,024 was cash, against current liabilities of $3,812,410, in a ratio of 1.9 to 1. At the close of the preceding year the company had current assets of $9,196,566, against current liabilities of $4,076,085, in a ratio of better than 2.2 to 1.

During the year the company acquired 74,054 shares of its stock and on December 31 held 140,058 shares at a cost of $1,270,358, or an average of, roughly, $9.06 a share. At the close of the previous year the company held 66,054 shares at cost of $1,288,293, or an average of, roughly, $19.50 a share. Earned surplus on December 31, 1931, amounted to $1,583,734, as compared with $6,054,315 a year earlier.

E. B. Reeser, president, told stockholders that operations during the year were limited to essential activities, that the Great Lakes Pipe Line Co.'s gasoline line, in which Barnsdall owns a 20.8 per cent interest, is in successful operation from the company's refineries to Kansas City, Des Moines, St. Paul, Minneapolis, Omaha and Chicago; and that substantial earnings to the Barnsdall Corp. should be available through distribution of pipe line dividends.

Salt Creek Producers

Salt Creek Producers Assocation reports for the year ended December 31, 1931, profit of $1,393,283 after charges and Federal taxes, but before depletion. This compares with 1930 earnings of $2,306,663.

Twenty Representative Stocks

The Oil and Gas Journal's weekly average price of 20 representative petroleum stocks listed on the New York Stock Exchange and New York Curb, based on closing quotations for Wednesday, was as follows:

July 22	21.32	Nov. 18	17.60
July 29	20.68	Nov. 25	16.68
Aug. 5	20.80	Dec. 2	16.09
Aug. 12	21.00	Dec. 9	15.38
Aug. 19	24.25	Dec. 16	12.60
Aug. 26	23.26	Dec. 23	12.06
Sept. 2	22.30	Dec. 30	12.31
Sept. 9	20.28	Jan. 6	12.69
Sept. 16	18.30	Jan. 13	13.63
Sept. 23	17.64	Jan. 20	13.14
Sept. 30	15.83	Jan. 27	12.79
Oct. 7	15.83	Feb. 3	13.19
Oct. 14	16.43	Feb. 10	13.02
Oct. 21	17.58	Feb. 17	13.28
Oct. 28	16.80	Feb. 24	13.45
Nov. 4	18.86	Mar. 2	13.61
Nov. 11	18.76	Mar. 9	14.38

Richfield Oil

Reorganization of Richfield Oil Co. of California, by J. Paul Getty and associates, with the co-operation of the bondholders of the Richfield company, now in receivership, is looked for, according to reports in financial circles. Mr. Getty now controls Pacific Western Oil Corp., one of the largest creditors of the Rich-

INDEPENDENT OILS ON NEW YORK CURB

Quotations Compiled by Francis, Bro. & Co., Associate Members of New York Curb, Kennedy Building, Tulsa, Okla.

(Complete record week ending Mar. 5)

1932 High	1932 Low	Week ending Mar. 5 Sales	Week ending Mar. 5 High	Week ending Mar. 5 Low	Close Mar. 9	Stocks		Outstanding capital	Par value	Div. rate	Payable or last paid	1929 High	1929 Low	1930 High	1930 Low	1931 High	1931 Low
½	¼	1,800	⅜	⅜	⅜	American Maracaibo	(sh)	700,000	N.P.	....	.....	8⅝	1⅜	4½	½	1¾	¼
2¾	2	300	2⅛	2⅛	2⅛	Arkansas Natural Gas	(sh)	4,084,235	N.P.	....	.....	26	3¾	16¾	4⅝	6½	1⅞
2⅝	1⅞	3,500	2¼	2⅛	2⅛	Arkansas Natural Gas "A"	(sh)	3,522,521	N.P.	....	.....	24¾	6½	16⅝	4⅝	6¾	1⅞
5½	4⅝	No sales	..	..	..	Arkansas Natural Gas pfd.	(sh)	2,193,000	$10	....	7- 1-31	9	4	8⅛	6¼	7	3⅞
9¾	8½	300	9½	9⅜	9¾	British American Oil Corp.	(sh)	2,622,642	N.P.	20eQ	10- 1-31	62	7⅞	23	13⅜	16⅞	6¼
⅝	¼	No sales	..	..	½	Carib Syndicate		$131,250	25c	....	.....	4⅞	1	2¾	⅝	2⅜	¼
6¾	5¼	52,000	6⅝	6	6⅝	Cities Service	(sh)	24,290,359	N.P.	30cA‡	2- 1-32	68⅛	20	44¼	13	20¾	5
53¼	44¼	1,700	53¼	51⅝	53⅜	Cities Service pfd.	(sh)	1,500,000	N.P.	50cM	2- 1-32	98¾	84	93⅞	78¼	84¾	35⅜
⅛	1/16	1,300	1/16	1/16	..	Columbia Oil & Gasoline v.t.c.	(sh)	$2,000,000	$1	....	.....	2	½	¾	⅛	½	1/16
1⅞	1⅛	1,200	1⅝	1⅛	1¼	Colombia Syndicate		3,250,000	N.P.	....	.....	..	..	21	3⅜	7⅛	1
⅝	⅜	1,200	½	½	½	Colon Oil	(sh)	2,200,000	N.P.	....	.....	15	3⅞	8¼	1⅛	3⅛	¼
7	5⅝	2,700	6¼	5⅞	6⅞	Consolidated Oil Corp. w.i.	(sh)	14,190,000	N.P.	....	.....	..	..	..	..	..	..
1	1	No sales	..	..	..	Consolidated Royal		$5,527,875	$10	5cQ	1-25-32	11⅛	2½	5⅞	2	2¾	1
⅞	½	1,200	¾	½	..	Cosden Oil	(sh)	323,950	N.P.	....	.....	135	42	74¾	1¼	3¾	⅜
2⅛	1⅝	200	1¾	1¾	2	Darby Petroleum (new)		1,019,392	N.P.	....	10-15-30	26	6½	21¾	4¼	5	1⅜
2⅛	1½	500	1¾	1⅝	2	Derby Oil & Refining	(sh)	500,000	N.P.	....	.....	11	2	11	2	6	1½
24½	20	500	24½	20	..	Derby Oil & Refining pfd.		48,500	N.P.	....	.....	44	20¾	60	30	40⅛	25
32	25⅜	1,500	29¾	28½	31¼	Gulf Oil Corp.	(sh)	4,504,921	$25	....	10- 1-31	209	115	166⅞	58½	75½	25⅜
4½	4	100	4	4	..	Indian Terr. Oil "B"	(sh)	7,090,037	N.P.	....	.....	..	..	53½	12⅝	16⅞	5
¼	⅛	2,200	1/16	⅛	⅛	Intercontinental Petroleum		$5,682,000	$5	....	.....	2⅞	⅜	1¾	⅜	⅝	⅛
⅝	⅜	300	½	½	..	Kirby Petroleum	(sh)	750,000	N.P.	....	.....	3⅝	1¼	3	⅞	1⅞	¼
½	¼	2,000	¼	¼	..	Leonard Oil & Development		$50,000,000	$25	....	.....	14⅞	2½	5	¾	2	½
...	...	....	..	..	..	La. Land & Exp.	(sh)	3,000,000	N.P.	....	.....	6⅛	1	4¾	½	1½	¼
2¼	1⅝	No sales	..	..	..	Lion Oil & Refining	(sh)	250,000	N.P.	....	10-27-30	38⅞	18	20	4⅞	6¾	1½
9¼	7⅛	3,600	7¾	7⅛	6⅝	Lone Star Gas	(sh)	5,000,000	N.P.	15cQ	3-31-32	67⅞	28	55⅞	19⅝	25	5½
1/16	1/16	104,700	1/16	1/16	1/16	Magdalena Syndicate	(sh)	850,000	$1	....	.....	1¼	½	½	1/16	½	¼
6⅛	3¾	300	6⅛	6⅛	..	Margay Oil Corp.		160,000	N.P.	25cQ	4-21-32	38½	14	16	3	5	1⅞
5¼	4½	900	5¼	4⅞	5	Memphis Natural Gas	(sh)	920,000	N.P.	15cQ	1-15-32	24	8⅛	22¼	7½	12⅛	4½
2	2	No sales	..	..	..	Mexico-Ohio Oil Co.		500,000	N.P.	....	.....	6⅜	2¼	7½	1¾	4⅞	1½
..	..	No sales	..	..	..	Mountain & Gulf		$4,000,000	$1	....	4-15-31	1½	½	¾	⅜	½	⅛
3	2¼	1,400	2¾	2½	..	Mountain Producers		$1,682,182	$10	20cQ	1- 2-32	22⅞	7	12⅛	3¾	5⅞	2
13½	11	900	13	12⅞	13⅜	National Fuel Gas	(sh)	3,810,183	N.P.	25cQ	1-15-32	43⅞	23	41⅜	19⅜	26½	9¾
⅝	⅜	200	½	½	..	New Bradford Oil		$1,095,291	$5	....	4-15-31	5	2½	3½	1⅛	1½	½
⅞	½	400	⅞	½	..	New Mexico and Arizona		$1,000,000	$1	....	.....	9⅜	2¼	7¼	1½	3	¾
1	⅝	No sales	..	..	..	North Central Texas	(sh)	400,000	N.P.	....	9- 2-30	18½	6⅛	11¼	2⅛	3¼	⅝
¾	¼	900	¼	¼	..	North European Oil	(sh)	1,372,391	N.P.	....	.....	..	..	6¼	⅝	2⅛	¼
6¼	4⅛	500	4½	4⅜	..	Pacific Western Oil	(sh)	1,000,000	N.P.	....	.....	26⅝	12⅛	19½	5½	15	2⅞
⅛	1/16	No sales	..	..	⅛	Pandem	(sh)	489,875	N.P.	....	.....	3½	½	2½	¼	½	1/16
½	¼	No sales	..	..	..	Pantapec Oil	(sh)	1,506,000	N.P.	....	.....	10½	1⅞	4⅜	⅞	2	⅜
7½	6¼	2,300	7	6⅜	..	Plymouth Oil	(sh)	1,050,000	$5	25cQ	12-21-31	37	22	27½	16¼	19	6
½	⅜	No sales	..	..	½	Reiter-Foster	(sh)	388,584	N.P.	....	12- 2-29	8½	1⅛	5⅜	1	3⅛	¼
1	½	No sales	..	..	..	Richfield Oil pfd. x.w.	(sh)	399,950	$25	....	.....	31½	22	23½	6½	11	¼
1	⅞	No sales	..	..	..	Ryan Consolidated	(sh)	500,000	N.P.	....	.....	11	2	8⅝	2	3	¾
¾	⅛	No sales	..	..	..	Salt Creek Consolidated	(sh)	1,286,300	$10	....	4- 1-31	5⅞	1⅞	2½	½	1⅜	⅛
3⅞	3⅛	300	3¾	3⅝	4	Salt Creek Producers	(sh)	1,496,859	$10	25c	2- 1-32	25⅞	9	15¼	5¼	7¾	2¾
½	¼	600	1/16	1/16	..	Sunray Oil	(sh)	1,163,185	$5	....	4-15-31	12	5⅝	10	2	5¼	¼
6½	5½	700	6½	6	..	Texon Oil & Land	(sh)	936,086	N.P.	....	3-31-31	23	7⅛	19½	8	12⅞	2½
½	1/16	500	½	1/16	..	Venezuelan Petroleum	(sh)	755,090	$5	....	2-15-30	6½	1¾	4½	⅜	1⅞	¼
2	1⅛	800	2	2	..	Woodley Petroleum		$500,000	$1	....	3-31-29	9½	2	5	½	3½	1⅛
1/16	⅛	1,600	1/16	¼	⅜	Y Oil & Gas		100,000	N.P.	....	.....	2⅞	½	2½	⅜	2¼	¼

*Ex-dividend. †Unit of trading less than 100 shares. ‡Payable monthly and monthly stock dividend of one-half per cent. §Paid in lieu of regular cash dividend of 2 per cent.

field, under a long term crude oil purchase which has several years to run.

According to financial quarters, Mr. Getty is expected to offer holders of Richfield first and collateral 6s, due in 1944, a new security equivalent to a percentage of their claims. If sufficient bonds are deposited, the plan calls for foreclosure on Richfield Oil Co. under the first mortgage, placing the mortgaged assets in the reorganized company. Working capital for the reorganized company, it is expected, will be offered by the Getty interests, and the reorganized company would pay off minority bondholders unwilling to exchange their securities. Unsecured creditors would satisfy their claims through liquidation of assets not included under the first mortgage.

Pan American Petroleum Co., Richfield subsidiary, is not included in the reorganization plans, although there is a possibility a separate arrangement might be made.

Cities Service Co., which reputedly controls Richfield of California through stock ownership, has no knowledge of the reported reorganization plans of the Getty group.

W. C. McDuffie, receiver for Richfield Oil Co. of California, recently re-

(Continued on Page 86)

STANDARD OIL STOCKS ON NEW YORK CURB

Quotations Compiled by Francis, Bro. & Co., Associate Members of New York Curb, Kennedy Building, Tulsa, Okla.

(Complete record week ending Mar. 5)

1932 High	1932 Low	Week ending Mar. 5 Sales	Week ending Mar. 5 High	Week ending Mar. 5 Low	Close Mar. 9	Stocks—		Outstanding capital	Par value	Div. rate	Payable or last paid	1929 High	1929 Low	1930 High	1930 Low	1931 High	1931 Low
⅛	⅛	200	⅛	⅛	..	Atlantic Lobos		499,448	N.P.	....	5-28-30	..	..	1	¼	1	⅛
6¼	6	50	6	6	..	Borne Scrymser		$1,000,000	$25	....	10-15-30	46½	25	25	11¼	16	6
35	30½	700	31	30½	..	Buckeye Pipe Line		$10,000,000	$50	$1Q	3-15-32	74½	55	69	39⅞	56	30
90	75	200	90	90	90	Chesebrough Mfg.		$3,000,000	$25	$1Q‡	12-30-31	210	130	184⅞	104¼	129½	75
2⅜	1¾	1,800	2¼	2⅛	2⅜	Creole Petroleum	(sh)	5,977,872	N.P.	....	.....	11¾	5⅜	7⅞	3	3⅞	1⅝
35	23	100	35	35	..	Eureka Pipe Line		$5,000,000	$100	$1Q	2- 1-32	70½	40	54¾	26	36	19
46⅞	42⅜	1,060	46	45½	48½	Humble Oil & Refining		$74,103,300	$25	50cQ	4- 1-32	128	74⅛	119	57¼	72	44¼
9¼	7⅝	1,800	9¼	8⅞	9⅜	Imperial Oil of Canada (new)	(sh)	25,421,768	N.P.	12½cQ	12- 1-31	41	22	30	15	18¼	7⅜
7½	6½	300	7½	7	..	Indiana Pipe Line (new)		$3,000,000	$10	25cQ	2-15-32	41⅞	26	41	14½	21⅛	5½
10⅝	8¾	7,100	10⅜	9⅞	10¼	International Petroleum (new)	(sh)	14,247,088	N.P.	25cQ	12-15-31	30⅜	15	24	11⅜	15½	7⅜
10½	6⅞	900	9½	9½	10½	National Transit		$6,362,500	$12.50	25cQ	12-15-31	25⅛	10⅛	22⅜	11½	17½	5
4	3	400	3⅝	3¼	..	New York Transit		$500,000	$5	10cQ	4-15-32	17½	10	21⅜	10⅛	14½	5⅞
4¾	3¾	700	4¼	4	..	Northern Pipe Line		$2,000,000	$50	$2SA	1- 2-32	63	41	54	26¼	35½	20
6	5⅛	100	6	6	..	Penn Mex Fuel		$10,000,000	$25	50c	10-31-31	44½	20	32	12	15½	5½
13	9⅝	900	13	12	14½	South Penn Oil		$30,000,000	$25	25cQ	12-31-31	60¼	35⅛	45⅞	16⅛	23⅞	9¼
10	8	200	10	10	..	Southern Pipe Line		$1,000,000	$10	50cQ	3- 1-32	22½	13	20⅞	8⅜	17	7
37	32	No sales	..	..	..	Southwest Pennsylvania Pipe Line		$1,750,000	$50	$1Q	4- 1-32	70	60	64	32	42½	25
16⅞	14	17,800	16⅜	15⅜	16⅞	Standard Oil of Indiana		$348,175,069	$25	25cQ	3-15-32	63	45	59⅞	30	38½	13½
14⅞	12	3,800	14⅞	13⅜	15¾	Standard Oil of Kentucky		$25,654,516	$10	40cQ	3-31-32	46⅞	29	40½	18⅝	23⅝	12⅛
19	15¾	100	18	18	..	Standard Oil of Nebraska		$4,649,225	$25	50cQ	3-21-32	50¼	40	48⅞	34⅝	36½	16
28⅛	23¾	300	26	25	27½	Standard Oil of Ohio		$14,000,000	$25	62½cQ	1- 2-32	129	60	108½	43¼	62½	23
..	..	No sales	..	..	..	Swan-Finch Co.	(sh)	34,480	$25	....	1-15-29	18	10	10	4	4½	1

*Ex-dividend. †Unit of trading less than 100 shares. ‡Plus 50 cents extra.

TRANSACTIONS IN OIL SHARES ON NEW YORK STOCK EXCHANGE

Quotations Compiled by Francis, Bro. & Co., Members of the New York Stock Exchange and Associate Members of New York Curb, Kennedy Building, Tulsa, Okla.

(Complete record week ending Mar. 5)

1932 High	1932 Low	Week ending Mar. 5 Sales	Week ending Mar. 5 High	Week ending Mar. 5 Low	Close Mar. 9	Stocks—		Outstanding capital	Par value	Div. rate	Payable or last paid	1929 High	1929 Low	1930 High	1930 Low	1931 High	1931 Low
14⅛	12	1,100	14⅛	13½	14¾	Amerada Corp.	(sh)	922,075	P.N.	50cQ	1-30-32	* 42⅝	17½	31½	16½	23	11¼
4	1¾	No sales	..	..	2¾	American Republics Corp.	(sh)	209,180	N.P.	....	12-31-30	64¾	12½	37	5⅛	12⅜	1¼
9¾	7¼	40	7½	7¼	8¾	Associated Oil		$57,260,300	$25	....	6-30-31	47¼	34½	51	30	31	8¾
11⅝	8⅝	10,700	11⅝	10¼	12½	Atlantic Refining		$67,416,050	$25	25cQ	12-15-31	77⅞	30	51⅜	16⅝	23⅝	8⅝
5⅞	4	7,600	5¾	4⅝	5	Barnsdall Corp. A		$56,546,600	$25	....	5-11-31	49⅛	20	34	8⅝	14½	4
15⅝	11⅞	57,650	15⅝	13⅛	15⅝	Columbia Gas & El.	(sh)	11,684,220	N.P.	37½cQ	2-13-32	140	52	87	30⅝	45⅝	11⅝
..	....	.....	....	....	....	Colonial Beacon Oil	(sh)	1,444,970	N.P.	....	12-22-22	32⅞	12½	20⅜	8¾	10½	7½
6⅞	5⅝	10,000	6⅜	6	6½	Continental Oil of Delaware	(sh)	4,741,554	N.P.	....	12-15-27	47⅜	18	30½	7¾	12	5
34¾	28	15,500	34¼	31¾	35	General American Tank Car	(sh)	811,647	N.P.	$1Q	1- 1-32	123¾	75	111⅞	53⅛	73⅛	28
15½	11	6,600	13¼	11⅝	13½	General Asphalt	(sh)	413,333	N.P.	50cQ	12-15-31	94¾	42¼	71½	22⅜	47	9⅝
23⅜	16⅛	6,400	22¼	19	23¼	Houston Oil		$24,968,600	$100	....	10-17-30	109	26	116⅞	29¼	68½	15¾
1⅝	1¼	8,600	1⅜	1¼	..	Indian Refining		$12,564,070	$10	....	10- 1-30	53	13⅛	17	2	4⅝	1⅛
1⅜	1	2,000	1⅜	1	..	Louisiana Oil Refining	(sh)	1,190,063	N.P.	....	.....	18	7	12	3½	4½	1
⅞	⅝	100	⅝	⅝	..	Maracaibo Oil	(sh)	330,000	N.P.	....	..... *	18½	5⅛	10⅜	1⅜	3¾	½
6⅜	5¼	1,900	5⅞	5⅝	6	Mid-Continent Petroleum	(sh)	1,857,912	N.P.	....	2-16-31	39⅞	22⅛	32	11	16¾	5
9¼	6	900	9¼	8	8½	National Supply of Delaware	(sh)	390,879	$50	....	5-15-31	144	98½	124¾	60	70¼	5
6½	5	3,200	5⅞	5⅜	7	Ohio Oil	(sh)	6,648,052	N.P.	....	3-14-31	79⅞	64¼	32	16	19½	5⅛
..	..	No sales	..	..	..	Pan American P. & T.		$50,084,700	$50	40c	1-20-32	69	40½	46½	42	35⅛	20
19	16	No sales	..	..	..	Pan American P. & T. "B"		$121,110,650	$50	40c	1-20-32	69¼	40½	67¼	30	36½	18
1¼	½	No sales	..	..	..	Panhandle P. & R.	(sh)	199,370	N.P.	....	.....	15¼	3	12¾	1¾	4¼	⅝
5½	4	No sales	..	..	6⅛	Phillips Petroleum	(sh)	2,593,075	N.P.	....	1- 2-31	47	24¼	44⅝	11½	16⅝	4
½	¼	900	½	⅜	⅜	Pierce Oil Corp.		$29,622,831	$25	....	.....	3⅜	1	2½	½	1½	¼
1⅛	⅝	800	⅞	⅞	1	Pierce Petroleum	(sh)	2,500,000	N.P.	....	2-16-31	5⅞	½	7⅛	1⅛	3⅜	½
7	4½	2,600	6¼	5¾	6⅞	Prairie Oil & Gas		$60,848,000	$25	....	3-31-31	65⅜	40½	54	11¼	20⅜	4⅛
8⅞	6⅛	9,100	8⅝	7⅞	9½	Prairie Pipe Line		$101,250,000	$25	....	6-30-31	65	45	60	16⅝	26½	5⅞
1½	1	400	1¼	1⅛	1⅝	Producers & Refiners		$37,438,950	$50	....	9-15-23	25⅞	4	11⅞	1	6	1
8¼	3½	No sales	..	..	..	Producers & Refiners pfd.		$2,845,350	$50	....	5- 4-25	46¾	25½	40	11½	16	3
5⅛	3⅞	2,700	4½	4¼	4⅜	Pure Oil		$75,959,250	$25	....	9- 1-30	30¾	20	27¼	7⅝	11⅞	3¼
¾	½	2,000	¾	⅝	¾	Richfield Oil (new)		$52,410,875	N.P.	....	.....	49⅝	20	9¾	4⅛	6⅜	⅜
2⅜	2	900	2¼	2⅛	2¼	Rio Grande Oil	(sh)	1,236,270	N.P.	....	7-25-30	42½	15	25¾	5	10¼	1¼
23	13¾	10,400	23	20⅜	21⅜	Royal Dutch N. Y.	(sh)	611,303	....	$0.938	8- 4-31	64	43⅛	56½	36⅞	42⅝	13
9¼	6¾	33,900	9¼	7¾	9	Seaboard Oil of Delaware	(sh)	1,244,383	N.P.	....	10- 1-24	59⅜	8¼	37	9¾	20¾	5½
15¾	8½	250	15¾	14½	..	Shell Transport & Trading Co.		£23,985,000	£1	$0.726	7- 6-31	51½	40⅝	48⅜	26	34	5
4	2¾	8,100	4	3½	3⅞	Shell Union Oil	(sh)	13,066,497	N.P.	....	6-30-30	31¾	19	25½	5¼	10¼	2½
30⅜	19	2,900	30⅜	24⅜	29¾	Shell Union Oil pfd.	(sh)	400,000	$100	....	7- 1-31	108¼	93	106¼	55	78	15
6	4⅝	2,200	5⅛	4⅞	5½	Simms Petroleum		$8,353,620	$20	....	9-15-30	40⅛	15	37	5⅝	11	3½
7⅛	4¼	40,200	6½	5¾	6⅞	Sinclair Consolidated	(sh)	5,500,000	N.P.	....	4-15-31	45	21	32	9¾	15⅞	4⅛
89	79	500	87	82	..	Sinclair Consolidated pfd.		$16,025,250	$100	$2Q	2-15-32	111	103	112¼	86	103	64
4	2½	1,000	3⅝	3	4	Skelly Oil		$27,441,250	$25	....	12-15-30	40½	28	12	10⅛	12⅞	2
17¾	12	No sales	..	..	17¾	Skelly Oil pfd.	(sh)	119,800	$100	....	5- 1-31	..	..	99¾	42	62	10
10¾	8¾	41,500	10	9⅝	10⅜	Socony-Vacuum	(sh)	31,923,072	$25	25c	3-15-32	..	..	106⅜	98	106	87⅛
91½	84¾	900	88	86⅞	..	Standard Oil Export pfd.	(sh)	764,885	$100	$2.50SA.	12-31-31	..	..	..	..	21	8⅜
27	22½	27,500	26	24¼	26¼	Standard of California	(sh)	12,594,098	N.P.	50cQ	3-15-32	81⅞	51½	75	42½	51¾	23⅛
12⅜	9	100	10	10	..	Standard of Kansas		$8,000,000	$25	....	3-16-31	33¾	18	49	14⅜	19	7¾
30½	25⅜	55,800	30½	28¼	30⅜	Standard Oil of New Jersey		$634,999,200	$25	25cQ§	3-15-32	83	49	84⅞	32½	52½	26
32	27⅜	100	32	32	..	Sun Oil	(sh)	1,416,869	N.P.	25cQ	12-15-31	68⅜	55	70	39	45¼	26¾
⅝	¼	300	½	⅜	½	Superior Oil Corp.	(sh)	766,979	N.P.	....	12-20-30	24	5¼	9⅜	¾	1⅜	¼
13⅞	10	25,500	12¼	11⅜	12⅞	The Texas Corporation		$246,204,900	$25	25cQ	4- 1-32	71⅞	50	60½	28¼	36¼	9⅞
2⅜	1⅞	500	2	1⅞	2⅜	Texas Pacific Coal & Oil Co.		$9,304,890	$10	....	12-31-29	23⅞	9½	14½	4	6½	1⅞
..	..	No sales	..	..	..	Tide Water Oil	(sh)	2,191,759	N.P.	....	6-30-31	40	14	31	13	18	9⅞
36	30	No sales	..	..	36	Tide Water Oil pfd.	(sh)	19,947,000	N.P.	$1.25Q	2-15-32	97½	85⅛	94⅞	71	83	30
3½	2⅜	9,800	2⅛	2½	2¾	Tide Water Associated	(sh)	5,560,424	N.P.	....	2-16-31	23½	10	17¾	5⅞	9	2⅛
27½	20	400	22	21¾	27½	Tide Water Associated pfd.		$73,284,500	....	$1.50Q	1- 2-32	90⅞	74⅛	89¾	55	68	20½
13⅞	10¾	2,900	12½	11⅞	13	Union Oil of California		$104,342,375	$25	35cQ	2-10-32	57	42⅛	50	10⅛	26⅝	11
19¼	15	1,700	17½	16⅞	19¼	Union Tank Car	(sh)	1,254,048	$100	40cQ	3- 1-32	163¾	121⅞	38½	23	25⅛	16
1¼	1	No sales	..	..	1½	Warner-Quinlan	(sh)	632,948	N.P.	....	7- 1-30	42⅞	15	27	4¼	7⅝	⅞
5¼	3¼	4,900	5¼	4¾	5¼	Wilcox Oil & Gas	(sh)	428,907	N.P.	....	5-10-28	29¾	12⅞	21	6½	9⅝	2¾

*Ex-dividend. †Unit of trading less than 100 shares. ‡Plus extra dividend of 25 cents.

In comparing highs and lows for the several years in the three tables, it will be necessary to take into consideration cases where there have been stock split-ups.

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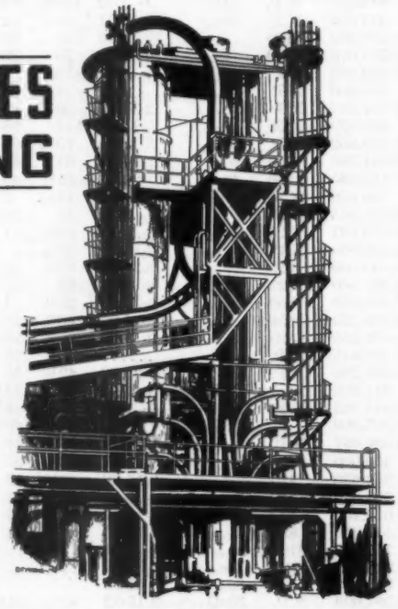

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BIG MEETING IS BEING PLANNED BY GEOLOGISTS

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14. East Texas Paleogeography and Oil Migration, by M. G. Cheney.
15. Boggy Creek Salt Dome, Anderson and Cherokee Counties, Texas, by H. J. McLellan, E. A. Wendlandt and E. A. Murchison.
16. Notes on Pre-Tertiary Rocks in Deep Borings at Jackson, Mississippi, by Watson H. Monroe.
17. Igneous Rocks of Central Mississippi Embayment Area, by C. L. Moody.
18. Buried and Resurrected Hills of Central Ozarks, by C. L. Dake and Josiah Bridge.
19. The Reynosa Problem, by W. Armstrong Price.
20. The Reynosa, the Upland Terrace, and Lissie Deposits of the Coastal Plain of Texas Between Brazos River and the Rio Grande, by A. W. Weeks.
21. Natural History of Petroleum with Special Reference to the Gulf Coast Crude Oil, by Donald C. Barton.
22. Notes on the Salt at Smackover, Arkansas, by W. C. Spooner.

Group 2. Geological Aspects of Petroleum Engineering

1. Improved Technique for Determination of Densities and Porosities, by H. R. Brankstone, W. B. Gealy and W. O. Smith.
2. Coring in Oklahoma City Field, by R. W. Brauchli.
3. Geology and Gas-Oil Ratios in Oklahoma City Field, by R. L. Clifton.
4. Proration at Oklahoma City, by Harold S. Thomas.
5. Character of Producing Sands and Limes in Wyoming, by John G. Bertram.
6. Value of Bottom-Hole Pressures in Geological Interpretations, by C. V. Millikan.
7. Water Encroachment in Bartlesville Sand Fields of Northeastern Oklahoma, by D. R. Snow.
8. Factors Involved in Segregation of Oil and Gas from Subterranean Water, by Jan Versluys.
9. Variation of Gravity with Depth in Mid-Continent, by Charles H. Pishny.

Group 3. Miscellaneous

1. Natural Gas Industry, by Henry A. Ley.
2. Natural Gas Other Than the Hydrocarbons, by C. E. Dobbin.
3. Natural Gas from Paleozoic Horizons in Southern Cincinnati Arch Region, by Willard F. Bailey.
4. Natural Gas Fields of Michigan, by R. B. Newcombe.
5. Valuation of Natural Gas Properties, by Eugene A. Stephenson.
6. Paleozoic Unconformities in Central Colorado and Their Stratigraphic Effects, by T. S. Lovering and J. Harlan Johnson.
7. Results of Drilling, and Oil and Gas Possibilities in Somerset and Fayette Counties, Pennsylvania.
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9. Geologic Interpretations from Rotary Well Cuttings. Part 1. Field Technique, by Robert M. Whiteside.
10. Geologic Interpretations from Rotary Well Cuttings. Part 2. Laboratory Technique, by Robert M. Whiteside.
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17. Petroleum Research in North Africa, by Henry de Cizancourt.
18. Comodoro Rivadavia Field, Argentina, by E. Fossa-Mancini.
19. Gas in South America, by William J. Millard.
20. Natural Gas Fields of Ontario, by R. B. Harkness.
21. Natural Gas Prospects in St. Lawrence Valley, by L. C. Snider and Linn M. Farish.

Geophysics

1. An application of the Reflection Seismograph, by Eugene McDermott.
2. Advances in Technique and Application of Resistivity and Potential Drop Ratio Methods in Oil Prospecting, by C. A. Heiland.
3. Preliminary Note on a New Magnetometer, by C. A. Heiland.
4. Measurements of Magnetic Susceptibilities of Some Rocky Mountain Granites, by Dart Wantland and C. A. Heiland.
5. Magnetic Resurvey of Oklahoma City Field, by O. C. Clifford, Jr.
6. A Semiportable Alternating Current Susceptibility Meter, by William M. Barret.
7. The Use of Record Character in Interpreting Results and Its Effect on Depth Calculation in Refraction Work, by T. L. Allen.
8. The Surface Aerated Layer, by O. C. Lester.
9. Accuracy of Torsion-Balance Determination of Relative Gravity, by Donald C. Barton.
10. The Geophysics of the Soil, by Paul Weaver.
11. The Curvature of Equipotential Surfaces, by M. M. Slotnick.
12. Sources and Magnitude of Errors Encountered in Reflection Profiling, by Burton McCollum.
13. Electrical Coring Process, by E. G. Leonardon.

GEOLOGICAL FEATURES OF IRAQ OIL FIELD

(Continued from Page 15)

Eocene and Cretaceous limestones, marls, and sandstones. Basal crystalline rocks are not known at the surface in Iraq, although they are shown on some geological maps. Post-Eocene basaltic lava flows and a few extinct volcanos, also post-Eocene, occur near the borders of Transjordania and Syria. Marine and nonmarine conglomerates, sandstones, shales, marls, limestones, gypsum and salt make up the maximum thickness in the geosyncline. The sequence is such that ideal cap rock-reservoir-source bed relations exist. The reservoir rock (the "main limestone") is made up of about 800 to 1,000 feet of dolomitic limestone, including beds of Middle Eocene, Oligocene, and Lower Miocene. The cap rock series is a red bed gypsum series with large amounts of medium to fine grained siltstone shale. Over 3,000 feet of black shale occurs below the Eocene.

Period of Folding

The principal period of folding occurred after Middle Miocene time, probably post Middle Pliocene. Compression came from the northeast acting against the rigid, thinly covered Arabian shield. The mountains formed are nappes and the foothills nearest the mountains where great thicknesses of incompetent strata accumulated are overthrust faulted folds involving interesting and complicated fault and hades problems. Farther from the mountains and where the incompetent covering of more competent strata is thin, almost symmetrical folds developed. The asymmetrical foothills structures appear at the surface as monoclines with the steep (southwest) flank and commonly part of the crestal areas covered by alluvium. Several more or less parallel folds make up the foothills belt. The structures are long, narrow, and sinuous with many crest maxima. Other types of structures undoubtedly exist buried under the alluvium which covers most of the area.

Oil Known 5,000 Years

Oil and gas in Iraq has been a matter of record for more than 5,000 years. The early Sumerians at Ur of the Chaldees used bitumen from the seepages. The Bible records the "burning bush," "eternal fires," etc. Seepages occur today throughout the mountain and foothills belts and west of the Euphrates near Hit. Small amounts of oil have been skimmed from many of these seepages and refined

in a crude type of primitive still for an unknown period. During the World War, the Germans, operating under the Berlin-Bagdad Railways concession, drilled seven shallow wells at Qaiyarah seepages near Mosul. None of these wells was drilled into the "main limestone," the "play" made famous by the Maidan-i-Naftun Field in Persia, and none probably ever produced more than a few barrels of oil. The Germans did, however, refine small amounts of oil from the seepages in a battery of primitive batch stills supposed to have been built by the Turks.

After the World War, the Anglo-Persian Oil Co., operating in the Transferred Territories of Iraq, completed their first well (No. 6) into the thick marine limestone series ("main limestone") at Naft Khaneh. The Turkish Petroleum Co., Ltd., (renamed Iraq Petroleum Co. in June, 1929), commenced to operate its Iraq concession in 1925. After completing a geological survey, drilling operations were begun on April 5, 1927, at Palkanah and soon afterward in five other areas. On October 13, 1927, low-grade oil was discovered in the "main limestone" at Qaiyarah, west of the Tigris, and on the following day, October 14, the discovery well, Baba Gurgur No. 1, of the now famous Kirkuk Field came in.

Three Discoveries

These three discoveries within less than two years by the two companies on three distinct structures in the foothills belt spaced roughly 75 to 100 miles apart marks the end of the new discoveries in Iraq to date. Oil at Qaiyarah occurs 700 to 1,100 feet below the surface, at Kirkuk 1,250-3,500 feet, and at Naft Khaneh 3,000 feet and deeper. In other structures of oil promise, which are as yet unproved, depths will range from a few hundred feet to depths beyond the present limit of the drill. Qaiyarah crude is similar in some respects to heavy Mexican crude. Kirkuk crude averages 35.7 degrees A.P.I., has a mixed base, is sulphurous, and is, in many respects, similar to Mid-Continent crudes of like gravity. Kirkuk and Qaiyarah wells flow under moderately low pressures (less than 200 pounds per square inch at casinghead), but Naft Khaneh wells flow under as high a pressure as 1,800 pounds per square inch at casinghead.

One Commercial Field

Up to December 31, 1931, I.P.C. had drilled tests in 10 different areas and had discovered one commercial field. Most of I.P.C.'s operations outside of Kirkuk and Qaiyarah have met with an unprecedented combination of mechanical drilling difficulties, including extremely high fluid pressures. One well had a reported water flow above objective of 125,000 bbls. per day with a flowing pressure of 1,300 pounds per square inch and a closed-in pressure which momentarily rose about 2,500 pounds. Heaving, caving, squeezing, and in some cases flowing manjak, accompany and complicate the pressure flows. Formation movements of different types have caused a large percentage of junked holes. The difficulties are confined for the most part to the asymmetrical fold-faulted structures located in the southern areas. So far, excepting at Naft Khaneh where conditions are not quite so extreme, no test has completely penetrated the 1,000 to 2,000 feet of difficult drilling in the pressure districts. It is needless to say that such difficulties have greatly slowed down operations and greatly increased the cost of exploration in Iraq. During 1929-31, drilling operations were suspended at Naft Khaneh (A.P.O.C.) pending the building of a pipe line to the Mediterranean.

Production Figures

The Iraq Petroleum Co. has produced no oil excepting that required for its field operations, but the Anglo-Persian Oil Co. produces and refines approximately 700,000 to 800,000 bbls. per annum for local markets. The latter production comes from their Naft Khaneh oil field and is refined in their refinery at Khaniqin. Any material increase in Iraq production over the total 1,000,000 to 1,200,000 bbls. per year produced at present awaits the construction of a pipe line to the Mediterranean. Because of many uncertain factors, it has not been feasible to build such a line until adequate production had been proved. Developments at Kirkuk now call for the construction of an 84,000-bbl. pipe line to the Mediterranean. Surveys on that project are nearing completion now and it is anticipated that construction will be finished some time before the end of 1935.

IRAQ PIPE LINE TO BE COMPLETED BY 1935

(Continued from Page 15)

the geologist, the pipe line engineer and the rotary drill. Yet a few years from now, when millions of barrels are surging through a welded steel tunnel to the Mediterranean, the chances are that the patient camel will survive in certain districts, totally oblivious of the invasion of his modern rival, and will still be used for peddling oil from surface seepages in the poorer districts. The principal seepages are along the Euphrates River, chiefly around the town of Hit, some 80 miles west of Bagdad. From hand-dug wells the native bails the oil with cans that likely enough came from Bayonne, N. J. The same cans are hung across the backs of camels or donkeys and transported to town. Around Hit the desert is spotted with cones of asphalt built up by gradual seepage and usually blowing off gas. Over everything hangs a perpetual pall of smoke from the oil fires under troughs in which the crude is boiled to drive off the light fractions, leaving the pitch that is the only product these primitive stillmen know how to save. It finds a useful outlet, however, in building and for caulking rude river boats, particularly the bowl-shaped "guffas" which are made of basket work heavily covered with pitch.

Iraq has aroused the curiosity of the oil world since the early part of the present century, and prior to the World War including the British, French and German interests had been engaged in development work there. With the declaration of war Germany's interest was seized. The next important step followed long agitation for an open door policy, and in 1925 the Iraq government granted the Turkish Petroleum Co. a concession entitling it to exploit oil resources in the kingdom for 75 years. American, British, Dutch, French and Armenian interests were represented in the Turkish Petroleum Co. The 1925 convention permitted the company to select 24 plots of eight square miles each for development. After four years, it was stipulated, the company must sell each plot to the highest bidder under government supervision. Only 192 square miles were assigned to the Turkish Petroleum Co. out of a total concession of 80,000 square miles.

In March, 1931, the agreement was modified. The Iraq Petroleum Co., as the Turkish Petroleum Co. had been renamed, obtained exclusive rights to those parts of Iraq lying in the Baghdad and Mosul provinces east of the Tigris River but excluding the Transferred Territories and the company, except for a minor reservation, gave up the area lying west of the Tigris. As it is now constituted, the Iraq Petroleum Co. is composed of the following interests, with the percentage of ownership indicated:

	Pct.
D'Arcy Exploration Co., Ltd. (Anglo-Persian Co., Ltd.)	23.75
The Anglo-Saxon Petroleum Co., Ltd. (Royal Dutch-Shell)	23.75
Compagnie Francaise des Petroles (French group)	23.75
Near East Development Corp. (Standard Oil Co. (N .J.), Standard Oil Co. of New York, Gulf Refining Co.)	23.75
Participations and Investments, Ltd., (C. S. Gulbenkian, et al)	5.00
	100.00

Discoveries So Far

Naft Khaneh was the first important discovery of recent years, being brought in early in 1927 by the Anglo-Persian Oil Co. In the fall of that year the Turkish Petroleum Co. (now Iraq Petroleum) brought in two fields, Qaiyarah and Kirkuk. So far this marks the total discoveries in Iraq. The country's own requirements are obtained from the Anglo-Persian Khanaqin refinery, which furnishes crude from the Naft Khaneh

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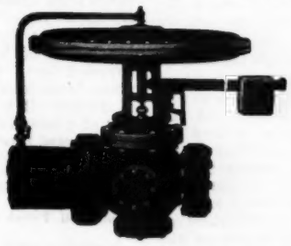

FOR the sake of prudence, rarely would so high a pressure be carried in a gas line up to the point of distribution. It is not here advocated. But the Fulton Low-Pressure Regulator would do its part, so far as that is concerned. More frequently, the pressure on the intake is one to fifty pounds and at the outlet a few ounces as required for safe and efficient use. Such reduction the C-F Regulator accomplishes exactly and surely. It is so balanced as to be unaffected by changes of pressure on the inlet side. It is easy to install, never sticks, reduces friction to a minimum and gives unfailing satisfaction.

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FULTON *Low-Pressure* REGULATORS

Field. The plant runs approximately 700,000 bbls. of crude a year. The Iraq Petroleum Co. has a small skimming plant at Kirkuk to supply its field requirements, but so far has not produced any oil for export.

Geologists find Iraq an interesting study. Oil lies at levels ranging all the way from surface seepages to depths beyond the reach of the drill. The Main Limestone, which composes the principal reservoir rock, is from 800 to 1,000 feet thick. Centuries ago a giant hand pushed irresistibly against the rigid, thinly covered Arabian shield. The earth crumbled under its pressure and today geologists find the underground structure faulted and folded in a complicated manner. Generally the structures are long and narrow, making test drilling a difficult and expensive task, for it takes only a slight miscalculation or a stroke of bad luck to miss the oil-bearing structure altogether.

Thus far, the driller in Iraq has not had to penetrate to any excessive depths in search for his oil, although he has found considerable rock pressure in some areas when he got down to the pay. Geologists estimate that the wells must reach from 700 to 1,100 feet below the surface in Qaiyarah and from 1,250 to 3,500 feet in Kirkuk. In other structures of oil promise which are as yet unproved, test wells would have to go to depths beyond the present reach of the drill.

Heavy machinery, tall steel rigs, massive pumps, drills, tools and thousands of feet of casing and drill pipe all are necessary on rotary jobs such as this. Just guess at the cost of transporting such material over the Iraq desert and through mountains where no trail exists and with hardly a stretch of railroad along the entire route. That is putting gray on the temples of the oil man there today.

What with drilling problems, transportation worries, international negotiations, expensive development and hostile Arabs, it is going to take him a long time to realize his heavy investment in Mosul oil.

DANCED BY LIGHT OF FIRST KANSAS GAS WELL

(Continued from Page 17)

pendence Gas Co.; C. L. Bloom, Pres.; A. P. McBride, Sec. and Treas.; J. D. Nickerson, Vice Pres.' The ample yard and the road in front swarmed with people, all in high praise of the display, and there was a long table set with rich cakes and lemonade and ice cream to tempt the hungry. It was a grand display and a generous provision for its entertainment.

"Immense Supply"—Enough for Lights

"So far the company has bored six wells in that vicinity. Brewster's well No. 1 is about 1,100 feet deep and furnishes an immense supply, in fact for all the lights burned last night save one. It is a gusher and it is thought that it, with No. 6, will warrant piping Independence. Wells Nos. 2, 3 and 4, while affording a little gas, are described as 'dry.' No. 5, now being bored on the George W. Waggoner farm, promises a big flow. No. 6 had just been completed yesterday and was not in condition to light for fear of a conflagration. However, it was piped off the ground and was lighted. It has not been tested, but is said to be as strong as No. 1. It now looks as if there is no doubt of a plentiful supply of gas and it is confidently believed that it will be used for fuel in our city this winter.

"Impromptu addresses were made by Senator McTaggart, J. R. Charlton, George L. Remington and others, and the Young America Band from this city was present and discoursed lively music, which added very greatly to the pleasures of the evening."

Interest in the wonders of natural gas underwent no diminution in the next year, as is evidenced by this item taken from the Wilson County Sun, Neodesha, Kans., of July 4, 1894, telling about preparations for an Independence Day celebration:

"In addition to the gas display at the corner of Fourth and Main Streets and Seventh and Main, there will be an artificial bubbling spring of gas and water on the corner of Fourth and Wisconsin Streets. Gas has been piped down Fourth Street and will be allowed to escape into the bottom of a barrel full of water set in another barrel. The two barrels are set in the ground about 4 feet. At night this spring will be set on fire. Don't fail to see it."

THE APPLICATION OF HERRINGBONE GEARS

(Continued from Page 16)

end of the low speed shaft, which is on the same side as the motor. In this design the use of an idler gear is advantageous because without it, it would be necessary to use a much larger gear wheel and pinion, which would make the gear unit more expensive. The lubrication of these gears is by means of an oil bath, as previously described. The gear housing is integral with the body of the pump and antifriction bearings are used. The same heavy lubricant as previously described is suitable since the velocity is less than 2,000 f.p.m.

Another assembly shows the gear wheel and the crankshaft unit together with the roller bearings. This type makes it possible to use the present day herringbone gear in connection with tapered roller bearings. Up until recently it was believed that herringbone gears could be run only when a certain amount of axial movement was permitted in either wheel or pinion. Modern precision gear cutting machines, however, permit the wheels and pinions to be held rigidly sideways because the teeth are so accurately cut that no end play is necessary to compensate for inaccuracies.

A compact vertical type pump, fitted with double reduction herringbone gears mounted on roller bearings, has as its main feature the small amount of floor space occupied.

On the crankshaft unit, the gears are of very wide face in proportion to the pitch. The gears in these pumps run noiselessly.

Lubrication of High-Speed Gears

From the foregoing it will be observed that one grade of lubricant is suitable for the relatively slow speed gears. During the past two years, however, the application of centrifugal pumps to pipe line service has become frequent and gear units for this purpose are highly specialized.

Tooth velocities in such gear units range from 4,000 f.p.m. up to 8,000 f.p.m. At these velocities the teeth cannot be permitted to dip in an oil bath. They are lubricated by a jet of oil which is supplied by a pump. This lubricating pump is an integral part of the unit and a suitable oil has a viscosity of 300 to 400 at a temperature of 100° F.

Speed-Increasing Gear Units

A centrifugal pump installation may be driven by a Diesel engine through a speed-increasing gear unit. Due to the high speed, both in revolutions per minute and in peripheral velocity in feet per minute, these gears require to be made with the utmost precision, and it is only within the past few years that the requisite degree of precision has been obtainable in order to insure that such gears will function wholly satisfactorily. An inaccuracy in tooth contour and in pitch not exceeding .0003 inch is the maximum permitted and it can be adhered to only by the use of most modern gear cutting equipment.

Precision in other elements is equally necessary; the shafts and the gear blanks must be machined with the greatest care; the alignment of the bearings and the rigidity of the housings has to receive special attention. Due to the high r.p.m., the bearings require to be force lubricated; further, due to the high speed, the oil must be cooled, and an efficient and economical cooler has been developed after careful study and experiment. Such details as a suitable lubricating pump, means of driving it, size and design as well as quality of pipe, fittings, valves, etc., are all important; the requisite volume of oil in the reservoir and the quantity necessary for spraying the teeth has been the subject of careful investigation.

Design of Speed-Increasing Gear Units

The proportion of the gears, especially as regards the addenda and dedenda of the teeth, in addition to the numbers of teeth in the pinions, are quite different to those used for speed reducing units.

In speed-reducing units the addenda of the pinions is advantageously made larger than the addenda of the wheels but the exact opposite is required in speed-increasing units, with the result that, in order to keep the whole of the involute tooth contour outside of the base circles, it is necessary to use pinions having a relatively large number of teeth. Preferably, in speed-increasing units, the numbers of teeth in pinions are between 27 and 40; otherwise high efficiency cannot be obtained, and, consequently, large numbers of teeth in pinions are essential where it is desired to keep the temperature within reasonable limits without resorting to an oil cooler of excessive size. Excessive heat, whether sensible or dissipated, represents a waste of power.

As already stated, a low viscosity lubricant is necessary. This in turn necessitates that the tooth pressures be kept relatively small; but, due to the high velocity, this presents no difficulty because, even with low tooth pressures, the size of the units is small relative to the size of the prime mover and of the pump. Unit tooth pressures less than 50 are adopted for these units whereas in speed-reducing units, or speed-reducing gears, the unit tooth pressure may be as high as 80; in some cases it is over 100.

Materials for Herringbone Gears

Generally speaking, the harder the material used the better, but there are certain practical limits which have to be observed. In small herringbone gears, such as are used for driving airplane propellers, exceedingly hard materials are practicable. But in larger gears it is impossible or impracticable to case harden or nitride the material and yet retain accuracy. Therefore, in large reciprocating pipe line pumps, where wheels vary from 6 to 10 feet in diameter, a material of a hardness exceeding 220 Brinell is not practicable. In pinions for such gears, however, the material may be heat treated up to a hardness of 250 Brinell, or even to 275 Brinell, but this is not always advisable due to the cost.

In gears used for oil well pumps the sizes are smaller and heat treatment is permissible. But, in general, a hardness greater than 275 Brinell is not practicable.

In gears for speed-increasing units, the pinion, being of small size, can be made economically in a chrome nickel or chrome vanadium alloy, heat treated to 200-250 Brinell. And the wheel, which usually consists of a cast iron center with a weldless forged steel rim, can have material for the latter of a hardness up to 220 Brinell. However, due to the necessity of keeping the cutting tools per-

CALIFORNIA CRUDE OIL PRICES

(Continued from Page 77)

Wheeler Ridge—55 cents per barrel for all grades (14° to 25.9°).
Coalinga—55 cents for all grades from 14° to 24-24.9°; 57 cents for 25 gravity.
Newhall, McKittrick and Kern River—55 cents for all grades (14° to 19.9°).
Montebello—65 cents for all grades (14° to 25.9°).
Whittier and LaHabra—65 cents for all grades (14° to 22.9°).
Elwood Terrace, f.o.b. ship—33° to 33.9°, 79 cents; 34° to 34.9°, 81 cents; 35° to 35.9°, 84 cents; 36° and above, 87 cents.
Playa Del Rey—Prices subject to field gathering charge of 5 cents per barrel—19° to 19.9°, 65 cents; 20° to 20.9°, 65 cents; 21° to 21.9°, 66 cents; 22° to 22.9°, 67 cents; 23° to 23.9°, 68 cents; 24° to 24.9°, 67 cents; 25° and above, 68 cents.

ASSOCIATED OIL CO. PRICES

Associated Oil Co. prices effective June 20 are as follows:
Ventura Avenue, 22 gravity, 58 cents, with 2 cents added for each degree upward to and including 30 gravity, which is 74 cents.
Kettleman Hills—The Associated Oil Co., effective at 7 a.m. February 5, 1932, withdrew and canceled any and all prices heretofore published and in effect for Kettleman Hills oil.
Potrero, 24 gravity, 69 cents, with 2 cents added for each degree upward to 34 gravity which is 69 cents.
General Petroleum Co. in Kettleman Hills, effective January 1, 1932: 33-33.9 degrees, 66 cents; 34-34.9 degrees, 68 cents; 35-35.9 degrees, 70 cents; 36-36.9 degrees, 72 cents; 37-37.9 degrees, 74 cents; 38-38.9 degrees, 76 cents; 39-39.9 degrees, 78 cents.

UNION OIL CO. OF CALIFORNIA

Crude Oil Prices for Its Purchases at the Well for Crude Produced in Strict Accordance With the Production Allocations Made by the California Statewide Curtailment Committee Effective 7 a.m., June 20, 1931
(All gravities above those quoted take highest price for that field)

Gravity °A.P.I.	Signal Hill	Alamitos Heights Seal Beach	Huntington Beach	Athens, Rosecrans, Dominguez	Torrance	Santa Fe Springs	Playa Del Rey* E. Coyote	Richfield	Montebello	Santa Paula	Orcutt	Coalinga	Lost Hills	McKittrick, Kern River Sunset-Midway, Elk Hills, Buena Vista Hills	Gravity °A.P.I.
11-13.9	....	....	....	....	....	....	....	....	....	....	....	....	....	$.50	11-13.9
14-14.9	$.65	$.65	$.65	....	$.65	....	....	$.66	$.65	$.65	$.55	$.55	$.55	.55	14-14.9
15-15.9	.66	.65	.65	....	.65	....	....	.66	.65	.65	.55	.55	.55	.55	15-15.9
16-16.9	.65	.65	.65	....	.65	....	....	.65	.65	.65	.55	.55	.55	.55	16-16.9
17-17.9	.65	.65	.65	....	.65	....	....	.65	.65	.65	.55	.55	.55	.55	17-17.9
18-18.9	.65	.65	.65	....	.65	....	....	.65	.65	.65	.55	.55	.55	.55	18-18.9
19-19.9	.65	.65	.65	....	.65	....	$.65	.65	.65	.65	.55	.55	.55	.55	19-19.9
20-20.9	.65	.65	.65	....	.65	....	.65	.65	.65	.65	.56	.55	.55	.55	20-20.9
21-21.9	.65	.65	.65	....	.65	....	.66	.66	.65	.65	.57	.55	.57	.55	21-21.9
22-22.9	.65	.65	.65	....	.66	....	.67	.67	.65	.65	.59	.55	.59	.56	22-22.9
23-23.9	.67	.67	.67	....	.67	....	.68	.68	.65	.65	.61	.55	.60	.58	23-23.9
24-24.9	.69	.69	.69	$.69	.68	$.65	.69	.69	.65	.66	.63	.55	.62	.61	24-24.9
25-25.9	.71	.71	.71	.71	.70	.65	.70	.70	.65	.68	.65	.57	.64	.64	25-25.9
26-26.9	.73	.73	.73	.73	....	.65	....	.72	....	.70	.67	....	.66	.66	26-26.9
27-27.9	.75	.75	.75	.75	....	.68	....	.74	....	.72	....	....	.67	.68	27-27.9
28-28.9	.77	....	....	.77	....	.71	....	....	....	.74	....	....	.69	.71	28-28.9
29-29.9	.79	....	....	.79	....	.73	....	....	....	.76	....	....	.71	.74	29-29.9
30-30.9	.81	....	....	.81	....	.75	....	....	....	.78	....	....	.72	.76	30-30.9
31-31.9	....	....	....	.83	....	.78	....	....	....	....	....	....	....	....	31-31.9
32-32.9	....	....	....	.85	....	.80	....	....	....	....	....	....	....	....	32-32.9
33-33.9	....	....	....	.87	....	.83	....	....	....	....	....	....	....	....	33-33.9
34-34.9	....	....	....	.89	....	.85	....	....	....	....	....	....	....	....	34-34.9

*Subject to a gathering charge of 5 cents per barrel.

fectly sharp during the finishing operation, a softer material is generally advisable; therefore, the Brinell hardness is usually kept below 220 Brinell.

Permissible Loads

Some reference has been made already to unit tooth pressures. The subject of load carrying capacity deserves a separate paper but it has been deemed advisable in this communication to give some data as a guide to operating engineers.

For high-speed precision gearing the well-known Lewis formula has been found unsuitable and new methods of gauging the load carrying capacity and determining the most suitable sizes of herringbone gears, have been devised. Without dealing fully with this subject, it may be said, first, the pitch diameter of the pinion is ascertained or determined, then the most suitable number of teeth for the pinion is decided. This automatically fixes the pitch. It should be pointed out, however, that the desirable number of teeth is to some extent flexible and, consequently, the number of teeth is chosen to suit a standard diametral pitch. The desirable number of teeth in pinions has already been dealth with. The number of teeth in wheels, after having fixed the number of teeth in pinions, is determined by the gear ratio. The unit load previously referred to is defined as the tooth load or tooth pressure per inch of pitch diameter of the pinion per inch of face width, and this factor, expressed in pounds, should lie between 40 and 100, depending to some extent on the tooth velocity but mainly on the nature of the service and on the characteristics of the material. A separate article, dealing with this subject, has been prepared but not yet published.

Direction of Rotation

The question often arises as to whether herringbone gears will operate equally well whether rotating with the apices of the teeth leading or in the reverse direction. It is usual to arrange for the direction of rotation with apices leading, however, it can positively be said that precision cut herringbone gears run equally well in either direction. Some engineers, however, have stated that the continuous tooth gear when running with apices trailing, traps the lubricant. This statement is due to a misconception. Herringbone gears, when properly made, have in any event a large bottom clearance. This in itself effectively prevents any trapping of the lubricant. The only case where any difference is observed is when the lubricant is abnormally heavy; then with apices trailing there is a crackling noise from the lubricant which does not occur when the apices lead, and is mainly noticeable at the start because of the lubricant being cold. The trouble in such a case is that the lubricant is too heavy and were straight teeth used, there would be a crackling effect in either direction of rotation.

There is another misconception in regard to this matter. Occasionally herringbone gears have been mounted in such a way that the pressure on the pinion shaft journals is upwards, with the result that when the bearing clearance is abnormal, or the pinion bearing housing weak, the pinion itself is displaced from its correct position and vibration together with noise sometimes results. It is easy to understand that when the pinion shaft is aligned with the engine or motor shaft in a stationary position, the pinion journals will rest on the bottom of the bearings. When the pump is put into operation, however, the pinion shaft climbs up, causing a displacement of its axis relative to the engine or motor shaft. A suitable flexible coupling will take care of this condition satisfactorily, providing the amount of displacement is not abnormal.

Alignment of Herringbone Gears

The alignment of herringbone gears is only more intricate in one respect than the alignment of straight tooth and single helical gears, and in most cases this one exception is not present. It is obvious that the axes of the wheel and pinion should be in the same plane and that the gears should run perfectly true on their shafts. This applies to all gears connecting shafts having parallel axes. The other requisite refers to the side adjustment. If both wheel and pinion are secured endwise, which is permissible, then the endwise adjustment should be precise. If only one member—either wheel or pinion—is fixed endwise, then the other should be protected from external thrusts. Herringbone gears will not satisfactorily take an end thrust and care should be taken to prevent any end thrusts being transmitted to them.

Backlash and Working Clearance

Herringbone gears of the precision type need very little backlash or working clearance. Where the load is uniform, however, blacklash is not detrimental, but in reciprocating pumps the load is not uniform, consequently, a small amount of backlash is desirable. The permissible backlash depends on the size of the gears or the pitch of the teeth. In fine pitch gears, up to 6 DP, the backlash should not be more than .002 inch to .003 inch; in larger gears, say up to 3 DP, the backlash may be up to twice this amount, and in gears over 3 DP it may be three times the amount.

Cutting Gears Having Sharp Apices

Engineers are curious to know how it is possible to cut herringbone teeth having sharp apices. It seems to the uninitiated that the absence of tool clearance is an insuperable difficulty. The following explanation is therefore offered:

The cutters are mounted on the gear cutting machine with their end-cutting faces facing each other. Both cutters are mounted on one reciprocating carriage, so that, as they reciprocate to and fro, one cutter cuts when the movement is in one direction, and the other cuts when the movement is in the opposite direction. The construction of the machine insures that each cutter will end its stroke when its cutting edges are at the center of the blank face. It may thus be assumed that when one cutter reaches the end of its cutting stroke it leaves a burr or chip, and that the other cutter, when completing its working stroke, removes this burr and leaves another one.

This is what actually happens, but there is another interesting and very important feature which makes this method successful. The cutters not only reciprocate and twist during their reciprocation, so as to generate the helices, but they also slowly revolve in unison with the wheel blank, thus generating the tooth contours. This generating feature happens to result in finishing the apices of the teeth in a perfect manner. It can be easily understood that if one cutter merely removes the burr left by the other cutter, and in its turn leaves a burr, there will be some burr left finally. The generating action, however, of these cutters makes it impossible to leave any surplus metal, provided the machine is properly adjusted, because as each cutting tooth slowly revolves out of engagement with the tooth space it has cut, it cuts a chip which tapers off to an infinitesimal thickness, and this has the effect of cleaning out the corners perfectly.

Herringbone Gears as Pump Rotors

Continuous tooth herringbone gears are used extensively for the gear type of pump by many makers. And during the past year pumps of large capacity, running at high speed, have been developed. An oil pump having a capacity of 625 gallons per minute at 200 pounds pressure per square inch, driven by a direct coupled motor running at 435 r.p.m. is standard size.

Smaller pumps of the type are made in a large variety of sizes for pressures up to 1,500 pounds per square inch and speeds up to 1,800 r.p.m.; one very small size operates at 3,600 r.p.m.

VENEZUELA REDUCES OUTPUT AS OIL TARIFF LOOMS HERE

NEW YORK, Mar. 12.—Plans for further curtailment of production in Venezuela are being made by principal producers, pending further clarification of the tariff issue in this country, it is reported here, and actual imposition of an import duty is expected to further slacken producing activities in Venezuela until distribution facilities have been readjusted.

Total output of crude in Venezuela in January of this year amounted to some 9,575,000 bbls., against approximately 10,400,000 bbls. in January of last year, and continued restricted output is anticipated until the world market position has shown further improvement.

Large operators at present are rushing supplies of crude from Venezuela, Mexico and Colombia to the United States in order to get the oil into the United States before the import duty, if adopted, becomes effective. This unusually heavy movement, naturally, is depleting storage stocks in producing countries, and the end of this abnormal movement should leave the producers in a better statistical position in producing countries.

The two principal American companies operating in Venezuela are already well fortified with respect to adequate handling for their output in that country. Lago Oil, subsidiary of Pan American Petroleum & Transport Co., in turn controlled by Standard Oil Co. (Indiana), has for the past two years been operating a 110,000-bbl. refinery at Aruba, and if the tariff impost should be sufficiently heavy to shut out the products of this refinery from the United States market, it is believed that the parent company will be able to divert sufficient export business to the Aruba plant to permit of its continued operation at present levels.

Creole Petroleum, subsidiary of Standard Oil Co. (New Jersey) until a few months ago was largely dependent upon the refinery demand of the New Jersey company and its affiliates, but the Creole enterprise, which included a producing field (Quirequire), pipe line and loading terminal, has now been rounded out with the building of a large topping plant at Carapito, the pipe line terminal, and with a large Chilean contract as a nucleus it is now understood that Creole has adequate outlets for its refinery production indepndent of the United States.

Gulf, another major American operator in Venezuela, has been shipping a large part of its crude output to Gulf refineries in this country, but with the recent confirmation of the Barco concession in Colombia as a Gulf property it is believed that this company, in the event of a prohibitive tariff, will have sufficient South American crude production to warrant the construction of refinery facilities in the Caribbean area.

Venezuelan subsidiaries of the Royal Dutch-Shell organization have been shipping considerable quantities of petroleum into the United States, but Shell has sufficient refinery facilities in the Caribbean area to take care of its crude output, and the world-wide Shell organization is in position to absorb any quantities of crude or products which the United States tariff may bar from this country.

Development work has been greatly curtailed in Venezuela. Only one completion was reported in January of this year, Creole finishing a well flowing 730 bbls. daily at 3,200 feet at Quirequire. Only five wells were drilling in all Venezuela at the start of the year.

ACCIDENT IS FATAL

Morris Young, aged 21 years, son of E. W. Young, district superintendent of the Stanolind Pipe Line Co. at Kansas City, was fatally burned when gas in a pipe line he was welding exploded. R. V. Crouch, aged 36 years, of Carrollton, Mo., was seriously burned in the same accident.

CONSTANT CONTROL ADDS TO EFFICIENCY

(Continued from Page 74)

following can be answered in the affirmative:

1. Is the rectifier on full automatic control?
2. Are control bypass valves closed?
3. Is the quality of the feed constant, as indicated by a uniform top temperature?
4. Is the quantity of feed steady and proportional to the rate of production?
5. Is the prescribed quantity of reflux being maintained at a constant rate?
6. Is the kettle temperature constant?
7. Is the column pressure constant?
8. Is the column residue being discharged at a smooth rate?
9. Is all water continuously bled out of all water pots?
10. Is the finished product discharged from the kettle at a steady rate?

USE OF BOTTOM HOLE CHOKES AID PRODUCTION

(Continued from Page 22)

day and night to make certain that the heater remained in adequate operation. Failure of the heater would cause complete freezing of the controls in a short time.

The problem has, however, been simply and very satisfactorily met through the use of removable bottom-hole chokes. The use of heaters has been eliminated, and the surface tubing connections, instead of operating under pressures in excess of 2,300 pounds as formerly, now operate at a pressure of only a little over 300 pounds. Turning a well into the line is no longer an operation requiring several hours for a crew of several men, but instead is a matter of only 5 minutes' work for one man. Delivery of gasoline to the surface is continuous and is not reflected on the meter chart. The decreased hazards to men and to the wells themselves and the greater economy of operation are obvious.

Pressure Reduction

Bottom-hole choking moves the point of pressure reduction, and consequently of refrigeration, from the surface to the bottom of the well, where temperatures are high enough to preclude the possibility of freezing regardless of how restricted the rate of production may be. Flow of small quantities of high-pressure gas through tubing is relatively slow, allowing ample time for heat exchange between this gas and the gas around the tubing. Consequently the normal delivery temperature of gas withdrawn at low daily rates, and before choking is applied, is that of the gas in the upper portion of the casing, or about the mean temperature of the area in which the well is located. In the case of the wells at Rodessa, this temperature was about 60°. This quantity of heat above freezing point thus stored in the gas was not, however, equal to the amount used as the gas expanded at the surface controls—consequently before bottom-hole chokes were installed it was necessary to apply additional heat to the gas by means of heaters to prevent the temperature being lowered below freezing before choking could be applied.

When bottom-hole chokes are used the gas enters the choke at the bottom-hole temperature of the well, or, in the case of the wells referred to, at a temperature of about 200°. At this temperature, the gas has more heat stored in it above the freezing point than is taken up as the gas expands at the outlet of the choke. Freezing cannot then take place. In addition, the high temperature of the gas around the tubing immediately above the point of choking causes a heat transfer to the cooler gas in the tubing, tending to again raise the temperature of this gas to the bottom-hole temperature of the well. The fact that the gas above the choke is at a comparatively low pressure results in increased flow velocity and less opportunity for the gas to lose its heat thus reacquired as it approaches the surface. The delivery temperature of the gas at Rodessa, even after having been

reduced in pressure to about 400 pounds at the bottom of the tubing, is actually about 10° higher than the delivery temperature was before being reduced in pressure at the surface.

Volume Variation

In these wells at Rodessa, flow through the choke is beneath the critical point—or the upstream pressure is less than half of the downstream pressure. Because of this fact, practically no flexibility of rate of withdrawal through the tubing can be secured. To reduce the rate of flow through a bottom-hole choke, a condition of flow above the critical point must be brought about. This, in the case of the wells referred to, would mean that the surface delivery pressure would have to be raised to about 1,100 pounds before a reduction in the rate of flow could be accomplished. At this pressure freezing would take place at the surface controls. Variation in the rate of withdrawal is not required in these wells at this time, but it has been found through tests now under way that sufficient variation in delivery rate can be secured by withdrawing gas from the casinghead in addition to that taken through the tubing. Gas taken from the casinghead must be reduced over the same pressure range that formerly was the case for gas taken from the tubing, and the same freezing problems again arise.

It appears, however, even under the extreme conditions tested that cold gas from the casinghead can be mixed with at least equal quantities of warm gas from the tubing with the temperature of the mixed gas still maintained above freezing. Under less severe conditions of pressure drop it is thought a still greater proportion of cold casinghead gas can be mixed with the gas from the tubing. Variation in control is thus secured by using a bottom-hole choke which will pass the estimated minimum rate of delivery, and by using the warm low-pressure gas thus delivered to heat the colder gas taken as needed from the casinghead.

Choke Size

All of the wells in the Rodessa Field, except the one not yet tubed, have been equipped with bottom-hole chokes. These chokes were run in under pressure on a steel line and set at a point about 75 feet above the bottom of the tubing. No difficulties other than those occasioned by the steady downpour of Louisiana rain were experienced. The installations were made by the Southern States Co. of Shreveport. It was interesting to find that the capacities of the several diameters of beans tested approximated very closely those published in various handbooks on natural gas. It is a simple matter, when the bottom-hole working pressure is known, to calculate the proper bean diameter for any desired rate of withdrawal. At these working pressures a 13/64-inch bean will daily deliver 400,000 feet more gas than a 12/64-inch bean at the same depth. This example illustrates the extreme sensitivity to diameter change at these pressures.

Because of the fact that the wells vary in open flow volume from a few million feet to over 75,000,000, it was thought at the outset that different bean diameters would be necessary for each well if equal deliveries were to be made from each well. This was not, however, found to be necessary, for a 12/64-inch bean in a 20,000,000-foot well produces almost exactly the same quantity of gas as the same diameter bean at the same depth in a 75,000,000-foot well. The explanation of this lies probably in the fact that the rate of withdrawal is low, that each well is kept on the line only a few days at a time, and that for these few days the quantity of gas stored within the casing acts as sufficient reservoir to prevent any material lowering of bottom-hole working pressure. Another interesting incident—one not yet satisfactorily explained—was the finding of a coat of ice within the tubing extending apparently several hundred feet down in two of the wells. Neither of these wells had been opened to the atmosphere nor placed on the line for several months, and there were no apparent leaks either in the surface connections or tubing.

The results obtained in the Rodessa Field make it appear possible to operate extremely high-pressure wells at low rates of delivery, with a reasonable flexibility of control of rate of delivery, and without the use of heaters and without the necessity of holding surface fittings under dangerously high pressures.

TAPERED TUBING BOON TO OIL INDUSTRY; CUTS COFFEE COST

Executives, petroleum engineers, production superintendents, lease men and others engaged in the production of crude oil have heard much about the use of "tapered strings of tubing" in wells, but it remained for R. B. Whitehead, chief geologist for the Atlantic Oil Producing Co., Dallas, to secure first hand information from a "super tubing expert." This report secured after much effort and at great expense is printed below for the enlightenment of the whole industry and a debt of gratitude is owed Mr. Whitehead for his valuable contribution to the science of oil production.

The report follows:

The lid is off—the secrets of tapered tubing exposed.

Tapered tubing is run into oil wells which have been prepared for same by drilling a hole in the ground until oil is hit or missed, as the case may be. The term "tapered" is not derived from the Wild Taper (Africano Swampus) as many people suppose, but is so-called because the sizes of the tubing run from small to large or visa versa, et cetera and etc.

The actual designs vary from a very short piece of very little tubing on bottom and a very long piece of big at the top to a long piece of little at bottom to short piece of big at top and visa versa. Usually there are some assorted sizes between the two just mentioned. It depends at all times upon the esthetic view of the engineer in charge. The purpose of tapered tubing depends upon what is needed. It has been known, in extreme cases, to make a salt water well produce oil. It will sometimes make a poor man moderately wealthy and change an independent producer to a supporter of the government. Tapered tubing removes paraffin, prevents corrosion and eliminates general lease work. It changes red figures to black and piles up the old income. From a modest beginning, when the author run a few thousand strings in West Texas purely as an experiment, the practice has grown by leaps and bounds until today most operators can scarcely wait for drilling to be completed so they can sock a string of tapered tubing in the well. This kind of tubing practice eliminates the worst features of bottom hole pressures, refines specific gravity to a fine point, entirely does away with the troublesome gas-oil ratio and restores reservoir energy to a run down oil sand. Last but not least, it has been known to change the crude from a "knocking" to an antiknock grade.

(Signed) PURDEE FROTH,
Supertubing expert.

P. S.—A recent experiment with an electric percolator equipped with a tapered tube showed a reduction of one watt per pound of coffee.

P. S. 2—I am now asking for some data on bottom hole pressure bombs and expect to be enlightened on this question soon.

INCREASED BUYING OF OIL SECURITIES

(Continued from Page 81)

ported a consolidated net loss of $3,632,913 for the past year's operations under receivership. The company's balance sheet as of December 31, 1931, showed current assets of $13,471,982 and current liabilities of $25,955,326, the latter including $10,290,194 of bank loans.

Tide Water Oil

Tide Water Oil Co. has returned to a dividend basis with the declaration of a dividend of 25 cents on the common, payable March 31 to stock of record March 19. The last previous dividend paid was 15 cents on June 30, 1931. It is expected a 25-cent dividend will be declared on Associated Oil as well, thus giving Tide Water-Associated, the holding company, sufficient funds to pay the dividend on its $6 cumulative preferred stock. Tide Water-Associated holds approximately 98 per cent of the capital stock of both Tide Water Oil and Associated Oil.

Wilcox Oil & Gas

The committee on securities of the New York Stock Exchange has received notice from the H. F. Wilcox Oil & Gas Co. of the proposed change in the par value of the 1,150,000 shares of common stock to $5 from no par and the exchange of one new share for each share of the old.

Cosden Oil

A plan for reorganization of Cosden Oil Co., which has been in receivership since November, 1930, has been announced by a committee of which J. S. Cosden is chairman, and which includes James Cameron, A. J. Duncan, H. B. Gutelius, Charles D. Hartman, Jr., Charles S. Hirsch, Richard L. Morris and Harold E. Talbot, Jr.

Under the plan, holders of secured obligations will receive up to the principal amount and interest to November 9, 1930, in a first mortgage 6 per cent special bond issue of the readjusted company, maturing one-fourth each in two, three, four and five years. Holders of unsecured obligations are to receive a general lien 5 per cent bond exchange up to the principal amount of their claims, with interest to November 9, 1930. Holders of old preferred will receive share for share in a new $100 par 7 per cent preferred stock issue, noncumulative for two years and cumulative thereafter. Holders of old common will receive share for share of new common.

Houston Oil

The Houston Oil Co. of Texas reelected the board of directors with one exception. A. H. Kennerly of Houston was named to succeed George Mackubin, resigned. The board of directors, in addition to Mr. Kennerly, comprises E. H. Buckner, George A. Hill, Jr., David Hannah, A. W. Standing, all of Houston; L. S. Zimmerman of Baltimore and B. H. Lang, T. S. Maffitt, Ethan A. H. Shepley, George E. W. Luehrmann, Samuel W. Fordyce and Samuel C. Davis of St. Louis.

Atlantic Refining

Expenditures by Atlantic Refining Co. for gross additions to plant and leaseholds, etc., during 1931, according to the report of J. W. Van Dyke, chairman of the board, included the following: Crude producing, $3,862,000; pipe line transportation, $8,503,000; refining, $4,334,000; marketing, $4,712,000; and marine, $840,000.

Pure Oil

Pure Oil Co. has declared the regular quarterly dividends of $1.50 on the 5¼ per cent preferred; $1.50 on the 6 per cent preferred and $2 on the 8 per cent preferred, all payable April 1 to stock of record March 10.

South West Pensylvania

Report of South West Pennsylvania Pipe Lines for year ended December 31, shows net profit of $155,498 after depreciation, etc., equivalent to $4.44 a share (par $50) on 35,000 shares of stock. This compares with $113,667, or $3.25 a share in 1930.

The company states that the tentative obligation under the annuity plan cannot be definitely stated and so does not show in the report. If the company stopped business, such obligation would amount to about $750,000, but it is expected that operations will continue indefinitely, the report says.

Standard Oil of Kentucky

Standard Oil Co. of Kentucky declared the regular quarterly dividend of 40 cents, payable March 31 to stock of record March 15.

Standard Oil of Ohio

Standard Oil Co. of Ohio has declared the regular quarterly dividends of 62½ cents on the common, payable April 1 to stock of record March 15, and $1.25 on the 5 per cent preferred, payable April 15 to stock of record March 31.

Socony-Vacuum Corp.

George D. Ali has been elected president of Standard Vacuum Transportation Co. Other officers elected are James J. McGuire, vice president; Walter E. Simpson, vice president, and Charles H. Kunze, secretary. Standard Vacuum Transportation Co. is a subsidiary of Socony-Vacuum Corp., in charge of marine equipment of the parent company.

Lone Star Gas

Lone Star Gas Corp. proposes to pay dividends on the common stock, beginning with June 30, at the quarterly rate of 16 cents per share in a new 6 per cent convertible cumulative preference stock, par value $100 per share, which will be junior to the existing 6½ per cent preferred as to dividends and assets, but which will be convertible into common until June 30, 1937, at the option of the holder, at the rate of seven shares of common for each preferred share.

A cash dividend of 15 cents per share on the common has been declared and will be paid March 31. This represented a reduction from the previous quarterly rate of 22 cents per share. Stockholders at the annual meeting April 5 will be asked to approve the creation of 100,000 shares of the new convertible stock, which, in addition to the features enumerated above, will be callable at $100 per share and accrued dividends at any time on 30 days' notice.

The proposed action is being taken because the present condition of the securities market does not permit the sale of securities on advantageous terms. Directors deem it advisable temporarily to suspend the payment of cash dividends in order to conserve cash and liquidate the corporation's unfunded debt and maintain a good cash position.

Standard Oil Co. of Kentucky has declared the regular quarterly dividend of 40 cents per share on the common, payable March 31.

Rio Grande

Rio Grande Oil Co. reports for 1931 096,949 was provided during the year for depletion, depreciation, amortization, abandonments, bad debts, inventory adjustments and contingencies. Net income for 1931 after operating expenses, taxes and interest, but before fixed charges, amounted to $1,620,500.

Houston Gas

The Houston Gas Securities Co. has been formed as a subsidiary of the United Gas Corp. under a plan to acquire the outstanding 5 per cent mortgage bonds of the Houston Gas & Fuel Co., due on September 1, on which the interest due March 1 will not be paid. There is $4,587,000 principal amount of the bonds outstanding.

The new company will offer to exchange its own 5 per cent collateral trust gold bonds, maturing on March 1, 1952, par for par for the bonds of the Houston Gas & Fuel Co. The new bonds will be secured initially by the Houston Gas & Fuel Co. bonds so acquired and also by an equal principal amount of 6 per cent gold debentures of the United Gas Public Service Co., principal operating subsidiary of the United Gas Corp. Interest will accrue on the new collateral trust bonds, and will be payable semi-annually.

When the plan becomes effective the holders of the Houston Gas & Fuel Co. bonds who deposit them for exchange will receive a sum equal to the unpaid interest up to March 1, 1932. The plan will become effective if 85 per cent of the old bonds are deposited for exchange by April 1.

Margay Oil

Margay Oil Co. has resumed dividend payments on its no-par common stock with the declaration of a quarterly dividend of 25 cents per share, payable April 11 to stock of record March 21. The last

previous dividend payment by the company was made on July 10, 1930, and was at the rate of 25 cents per share.

South Penn Oil

South Penn Oil Co. declared the regular quarterly dividend of 25 cents, payable March 31 to stock of record March 15.

Mexican Petroleum

Action on the quarterly dividend of Mexican Petroleum Corp., scheduled for March 1, has been postponed until later in the month. The last previous payment of $2 was made on January 20.

Borne-Scrymser

Borne-Scrymser Co. reports as of December 31, 1931, total assets of $1,779,700, as compared with $1,505,015 as of December 31, 1930. Profit and loss surplus was $362,497, against $436,909.

British-American

British-American Oil Co. reports for 1931 net profit of $2,730,930 after interest, depreciation and Federal taxes, equivalent to $1.04 a share on 2,622,642 no-par shares, compared with $2,648,033, or $1.01 a share in 1930.

Simms Oil

Simms Petroleum Co. has acquired 77,000 shares of its stock under the offer to purchase from shareholders 100,000 shares at $5 a share, it is reported here, with arrangements made to buy the balance of about 23,000 shares. The offer, which expired February 10, permitted shareholders to sell stock to the company up to one-seventh of their holdings. This was the second repurchase offer made by Simms, the previous one being in October, 1931, for 100,000 shares at $6 each. Of the former, about 15,000 shares were purchased in the open market.

New Jersey

Standard Oil Co. of New Jersey has started the distribution of shares acquired by employes in the third stock acquisition plan that closed December 31 after three years' operation.

Eureka Pipe

Eureka Pipe Line Co. reports for 1931 net earnings of $211,662 after charges and taxes, equal to $4.23 per share on the common, as compared with $17,054, or 34 cents per share in the previous year.

United Gas Corp.

United Gas Corp. has declared the regular quarterly dividend of $1.75 a share on the $7 preferred stock, payable March 1 to stock of record February 10.

Empire Gas & Fuel

Empire Gas & Fuel Co. has declared the regular monthly dividends of 66⅔ cents on the 8 per cent preferred, 58⅓ cents on the 7 per cent preferred, 54 1/6 cents on the 6½ per cent preferred and 50 cents on the 6 per cent preferred stocks, all payable March 1 to stock of record February 15.

Chesebrough

Chesebrough Manufacturing Co. has declared an extra distribution of 50 cents a share on the $25 par common stock, together with the regular quarterly dividend of $1, both payable March 31 to stock of record March 10.

New York Transit

New York Transit Co. has declared a dividend of 10 cents per share on the new $5 per capital stock, payable April 15 to stock of record March 25. In previous quarters the company paid dividends on the old $10 par stock of 15 cents regularly and 10 cents extra. On February 15 a capital distribution of $5 per share was paid and new $5 par certificates exchanged for the old $10 par certificates.

Memphis Natural Gas

Memphis Natural Gas Co. reports for 1931 net income of $668,283, after taxes, depreciation, interest, amortization, etc., equal after dividend requirements on the 87 no-par preferred stock to 68 cents per share on 918,680 shares of no-par common stock outstanding at the close of the year. This compares with $463,865, or 43 cents per share on 920,000 common shares in 1930.

North American

North American Oil Consolidated reports for the year ended December 31, net profits of $32,162 after charges, depreciation, depletion, taxes, etc., equal to 12 cents a share on 275,659 shares of capital stock. This compares with net of $727,165, or $2.57 a share, on 283,159 shares in 1930.

Texas Gulf

Texas Gulf Producing Corp. reports for December net income of $78,733 after all charges, including depreciation and depletion, but before Federal taxes. This is the first month's operation of the company under its new name. The predecessor company had net of $85,708 in November and $44,836 in October.

Honolulu Oil

Honolulu Oil Corp., Ltd., reports for the year ended December 31, net loss of $171,853 after depletion, depreciation, taxes and intangible drilling costs. This compares with net profit of $2,120,472, equal to $2.24 a share on 944,315 shares of common, in 1930.

Pacific Western

Pacific Western Oil Corp. reports for 1931 net loss of $903,124 after interest, depreciation, depletion, abandoned leases, taxes, etc., compared with net profit of $2,316,544 in 1930.

During 1931 the outstanding funded debt of the corporation was reduced $1,595,500. Of this amount $1,576,500 was canceled and $16,00 remained on hand. The cost of the debentures canceled was $984,567, leaving a profit of $591,933, or the difference between the cost and the par value. This profit was credited to surplus but was not taken through the income account. With the retirement of these debentures, all sinking fund requirements have been complied with up to and including January 1, 1934. Since the date of issue, $2,330,500 par value of the debentures has been retired, leaving $13,169,500 oustanding as of December 31.

North Central Texas

North Central Texas Oil Co. has declared the regular quarterly dividend of $1.62½ on the 6½ preferred stock, payable April 1 to stock of record March 10.

Paraffine Companies

Paraffine Companies, Inc., has declared a quarterly dividend of 50 cents, payable March 27 to stock of record March 17, against 75 cents a share paid in the previous quarter, prior to which the stock was on a $4 annual basis. The company reports for the calendar year 1931 net profit of $1,270,564, or $2.62 a share on the common.

Skelly Oil

Skelly Oil Co., for 1931, had a net loss of $2,117,110, due to the adverse conditions affecting the oil industry, the annual report of W. G. Skelly, president, to the stockholders discloses.

CONDEMNS OIL FRAUDS

FORT WORTH, Tex., Mar. 14.—Condemning oil thefts and urging that steps be taken to bring about their cessation, directors of the Texas Oil and Gas Conservation Association went on record as aligning itself with law enforcement authorities seeking out such crimes. A resolution passed by the directors declared that the association would lend its aid to the discovery and prosecution of persons found guilty of such fraud.

Other action taken included the adoption of bylaws prepared by a committee named by President Charles F. Roeser, and the acceptance of the six-point platform which has been advocated by the association since its organization some six months ago. E. H. Eddleman, executive vice president, reported a membership now of more than 4,600.

NORTH TEXAS ASSOCIATION

WICHITA FALLS, Tex., Mar. 14.—Merrill W. Blair was elected president of the North Texas Oil & Gas Association at a meeting of the new directors. Other officers elected were R. A. King, first vice president; T. O. Shappell, second vice president, and Fred Sermann, secretary.

The program for 1932 was outlined and at the next meeting committees will be appointed to take charge of their particular lines of work.

Retiring officers at the meeting were T. F. Hunter, president; P. B. Flynn and E. H. Eddleman, vice presidents.

NEWEST BOOK ON "OIL ECONOMICS" BY OSBORN

A new book on "Oil Economics" by Campbell Osborn, attorney, Tulsa, is just off the press of McGraw-Hill Book Co., Inc., 330 West Forty-second Street, New York City. This is a valuable contribution to the literature of the petroleum industry at this time when the subject of economics is receiving special consideration in all branches of the industry.

The book presents a careful study of the principal economic factors related to petroleum, natural gas, and allied substances, as well as practical methods of analyzing values and forecasting price movements and profits. It contains 18 chapters, with preface, appendix and a selected list of publications.

These chapters deal with the function of oil economics, financial structure of the industry, and demand, supply and price. From these opening statements the text goes on to develop the demand for petroleum, the supply of oil, crude oil producing costs and substitutes, and then deals with transportation and storage, refining and marketing, prices of refined products and price of crude petroleum. Other chapters cover economic balance of an oil company, natural gas industry, economic control of operations, valuation of oil and gas lands, and oil securities. The final chapters deal with foreign petroleum conditions and conservation of oil and gas.

It is a well rounded out study of the economic conditions that effect the oil industry and is so written as to be of special value to oil men, investors and others interested in petroleum and its products, as well as natural gas and allied substances. It is priced at $4.

BELIEVES CUBA HAS OIL POSSIBILITIES

DALLAS, Tex., Mar. 12.—Cuba is one of the few large untested possible oil-producing areas sufficiently near American markets to justify consideration of operators interested in reserves in large tracts, J. Whitney Lewis, local geologist, declared in an illustrated talk on the geology of Cuba sponsored by the Dallas Petroleum Geologists.

"A large portion of the island of Cuba is underlain by a column of angularly conformable unmetamorphosed sediments," said Mr. Whitney, who studied the geology of the island while stationed there. "The basement of this column is composed of highly metamorphosed schists, shales, marbles and granites. Above this a thickness of from 1,500 to 2,000 feet of highly bituminous limestone and shale of Jurassic age. Above the slightly folded and eroded Jurassic sediments are the basal conglomerates and the sands, shales and limestones of the upper cretaceous. Conformably above these are the early Tertiary limestones, marbles and shales and finally the very cavernous limestones of Miocene age. The surface rocks apparently reflect the structure of those which lie at greater depths.

"The cretaceous conglomerates and sands, which rest on the Jurassic and are sealed by the overlying shales, appear to be the probable reservoir beds of such petroleum accumulations as may have existed. Under proper structural conditions these beds may reasonably be expected to contain petroleum at the present time. In most areas where favorable structure is known to exist these conglomerates are believed to be within 4,500 feet of the surface. The basal conglomerate is of the same age as the Woodbine sand of Texas."

UPHOLD SOUTH CAROLINA LAW

WASHINGTON, D. C., Mar. 14.—The Supreme Court today held valid South Carolina gasoline tax when applied to airplanes making purchases in that State in trips from New York to Miami, Fla. The Eastern Transport Co. appelant contended the tax was levied on interstate commerce and they should be exempt but the court did not distinguish between purchasers by airplane and automobiles passing through the State.

Survey Shows Motor Fuels Increasing in Vapor Pressure

The twenty-fourth of a series of semi-annual surveys pertaining to motor fuel quality in the United States has been completed by the Bureau of Mines and the results are reported in a paper designated as R.I. 3,162.

Tests were made in the usual manner but a greater number of samples were collected. This time the samples were correlated into two groups, the competitive gasolines and the premium fuels. Because of the greater number of samples and a lesser appropriation for making the tests, the bureau has decided to make but one survey each year and the winter survey will be dispensed with.

A summary of the results reported are included below and in another report now being prepared the trend of octane ratings will be shown.

A total of 319 samples was collected in 19 areas throughout the United States during August, 1931, for the twenty-fourth gasoline survey. Two hundred and twenty-one of these samples were competitive-price gasolines, and 98 samples were premium-price motor fuels. This report presents the results of the examination of these samples in accordance with the new Federal specification for U. S. Government Motor gasoline, which will become mandatory for all departments and independent establishments of the Government after March 1, 1932. This analysis indicates that only two of the samples failed to pass the corrosion test; five samples, or 2.3 per cent of the competitive-price gasolines, failed to pass the distillation test; 14.6 per cent of the competitive-price gasolines failed to pass the sulphur requirement; and 35.7 per cent of the competitive-price gasolines had Reid vapor pressures higher than 8 pounds per square inch and therefore did not come within the optional maximum requirement of the Federal specification, although all of the samples came within the specification requirement of 12 pounds.

Taking account of those samples that failed in more than one requirement, and including the optional maximum requirement of 8 pounds vapor pressure, 105 of the competitive-price gasolines, or 47.5 per cent, failed to pass the requirements of the new Federal specification.

This survey indicates a reversal of the tendency toward higher sulphur content than was noted in previous surveys. As has been pointed out, this may be a temporary condition due to the increased production of crude oil from East Texas, which has a low sulphur content, and contains a relatively large proportion of gasoline. The increase in average vapor pressure over that observed for samples collected in August, 1930, is especially noticeable.

TIDE WATER PROMOTES MACK

NEW YORK, Mar. 14.—John Mack, associated with the engineering department of Tide Water Oil Co. since his graduation from the University of Pennsylvania in 1926, has been appointed design superintendent of the engineering department. During the past six years he has superintended changes in equipment at Tide Water's Bayonne refinery, including the centrifuge plant, the Weir plant, new refrigerating plant in No. 1 building, and other equipment in the filter and press plants.

EAST TEXAS PALEOGEOGRAPHY

FORT WORTH, Tex., Mar. 14.—M. G. Cheney, geologist, and president of the Anzac Oil Co., Coleman, Tex., addressed the East Texas Geological Society at Tyler, Thursday. He is to address the Dallas Petroleum Geologists at 8 p.m., Thursday, March 17, at the Baker Hotel, Dallas, on "The Paleogeography of East Texas and Its Relation to the Migration of Oil." This was the subject of his talk at Tyler, also.

Important Tests in Tioga County Deep With No Showing

By Special Correspondent

WELLSBORO, Pa., Mar. 12.—The heaviest snowstorm in years, which was accompanied by a wind that created immense drifts and made roads impassable in places, slowed up operations in the northern Pennsylvania and southern New York gas fields during the past week.

Clyde Campbell's No. 1 Sherwood, in the Rathbone Field, Steuben County, New York, which struck a small oil production at 825 feet, was drilled deeper and at 1,300 feet opened a 500,000-foot gas production. The well will be produced from both sands. The oil sand is good for about 4 bbls. per day of high gravity crude.

The Empire Keystone Oil & Gas Co. is building rig for a test on the Frank Platt farm, 2 miles west of Painted Post, Steuben County, where Oriskany sand lies between 2,600 and 2,700 feet in depth.

For some time past a seismograph crew from Texas has been at work in southern New York and northern Pennsylvania, making surveys in search of gas structures. Twelve men are engaged in the work which is entirely new to most operators in this area. At present the crew is working in the neighborhood of Binghamton, N. Y.

Gas men have little hope that the Allegany Gas Co.'s No. 1 Davey, in Richmond Township, Tioga County, or the Wells company's No. 1 County Farm, will make gas wells. Both are deep in the Oriskany sand with nothing showing. Keefer's No. 1 Schofield is drilling near the sand at 5,100 feet. This test is in Richmond Township.

Over to the west, in Potter County, J. B. Reed is below 500 feet in a test on the Champlin farm in Allegany Township, and a location has been made by unnamed parties on the Tassell farm in Clara Township. The Allegany Gas Co. is drilling below 4,400 feet on the Emporium Lumber Co.'s tract in the East Fork district.

To the east, in Bradford County, the Penn United Gas Co.'s test on the Towanda fair grounds was cleaning out at 4,650 feet, total depth 5,307 feet.

IMPERIAL BUYS STATIONS

Imperial Oil Co., Ltd., has acquired the service stations of the Domestic Storage & Forwarding Co., comprising 20 in Toronto, 11 in Hamilton and 1 in Montreal, Canada.

OKLAHOMA GASOLINES CONTINUE TO ADVANCE

(Continued from Page 12)

and the market for motor fuels remains at present levels, the manufacturers are realizing from one-half to 1 cent a gallon more by manufacturing the finished motor fuels.

Large Volume Available

Many refiners do not realize the volume of natural gasoline available for stabilization to be sold in direct competition with their products unless other outlets are provided. The Mid-Continent (Oklahoma, Kansas, Inland Texas, Arkansas, North Louisiana) natural gasoline output is now about 2,500,000 gallons (300 cars) daily. The refinery gasoline output for the same area is approximately 10,000,000 gallons (1,250 cars) daily.

Normally a large part of this natural gasoline output is sold direct to large Gulf Coast refiners and exporters and does not come in direct competition with Mid-Continent refinery gasolines. Mid-Continent refiners usually absorb larger quantities of the regular grades of natural gasoline than they have over the past 90 days. If the relatively small buying by Coastal and Mid-Continent refiners continues, the natural gasoline manufacturers obviously will be forced to go more and more to stabilization and sell their products as finished motor fuels. From the standpoint of the refiners this means additional competition in their market which will total in excess of 100 cars a day unless relative price conditions change. This in effect means that the Mid-Continent will lose all the benefit derived from its program of reduced crude oil runs to stills and lessened output of refinery gasoline.

Gasoline and Naphtha

There was a steady demand for low octane U. S. Motor gasoline until the price passed the 3¼-cent low. Since that time trading has been slower with some resale material available under the price of 3½ cents established by refiners. The 57-65 octane U. S. Motor gasoline is available three-eighths of a cent above the low octane price and 65 and above octane, five-eighths of a cent. The three grades of 60-62 400 endpoint gasoline could be purchased one-eighth cent above the U. S. Motor prices.

A low of 3¾ cents was asked for 390 endpoint, 64-66 375, 3⅞ cents, and 68-70 350 and 360 endpoints 4⅛ cents. These prices are yet to be firmly established because there is little trading in these grades. Blending naphthas continue in strong demand and the 50-52 450 endpoint was firm at a low of 3⅜ cents. These naphthas are desired by natural gasoline blenders who can use up to 50 per cent of 26-70 grade natural gasoline in blending.

Natural Gasolines

On Monday, the 26-70 grade natural gasoline sold at 1½ to 1⅝ cents and Tuesday sales reflected an advance of one-eighth cent. Grade 30-70 was still available at 1½ cents and Grade 18-55 was firm at a low of 2 cents. Sales of the grades under 16 to 12 pounds vapor pressure ranged from 2½ to 3 cents. The lower vapor pressures ranged up to 5 cents.

As previously explained the main interest centers in the low vapor pressure stabilized grades and the volume of material moved has reduced the quantity of 18 to 30-pound grades offered.

Other Products

Kerosenes, tractor fuels and furnace oils are unchanged in price so far as the Oklahoma market is concerned. The buyers still continue to have more trouble in placing their spot orders for these products than do the sellers in obtaining them. There was considerable spot buying of the 41-43 water white kerosene at a low of 2⅝ cents over the week.

There have been more inquiries for tractor fuels since the first of the month. Although the price differential between kerosene and tractor fuel is only a half cent a gallon some of the larger distributors and jobbers have worked up a substantial business for the tractor fuels and this movement should improve materially over the next 30 days. The grades offered vary from 38 to 41 gravity and from straw to prime white in color. Buyers usually require a flash under 175 and an endpoint under 575. Prices range from 2 to 2¼ cents.

Oklahoma sellers of furnace oils continue to have sufficient orders to absorb their output. Prices range from 1¾ to 2⅛ cents.

Fuel oils are strong. Several buyers were willing to pay 50 cents for 28-30 zero to 10 and found supplies limited. The industrial and public utility movement of the lower gravity grades continues encouraging to the sellers. Prices are unchanged.

TANK WAGON CHANGES

(Continued from Page 78)

at Birmingham 1 cent to 11 cents, and on March 7 advanced price to 12 cents. Company, effective March 4, advanced gasoline service station price at Tampa, Fla., 1 cent to 20 cents.

Standard Oil Co. of New Jersey, effective February 17, reduced gasoline tank wagon 1.7 cents and service station 2.2 cents at Salibury, N. C. Both prices now 18 cents, including 6-cent tax.

Magnolia Petroleum Co. effective March 16 advanced kerosene tank wagon prices 2 cents at Little Rock, Ark.

CRUDE OIL PRICE CHANGES

(Continued from Page 78)

Line lines 5 cents per barrel, making the new price $1.35 per barrel. Same company on March 14 lowered the price of Pennsylvania grade oil in National Transit lines 3 cents per barrel. The Pennzoil Co. did likewise and the Tidewater Pipe Co. lowered the price of Bradford and Allegany district oil (Pennsylvania grade) 3 cents per barrel, effective March 14.

JOHN L. MORAN DEAD

John L. Moran, an oil operator known in many Mid-Continent and Eastern fields, died at his home in Bartlesville, Okla., on Tuesday, March 8, at the age of 80 years. Mr. Moran was president of the Test Oil Co.

Mr. Moran was born in Jamestown, N. Y. He entered the Bradford Field in the early days of development there and later operated in Pennsylvania fields farther south and in West Virginia. He came to Oklahoma 28 years ago and took a prominent part in the development of the northern Oklahoma fields.

Mrs. Moran and three daughters survive him. The funeral and burial were conducted in Bartlesville.

SINCLAIR URGES LAWS TO AID CO-OPERATION

NEW YORK, Mar. 14.—Urging modification of existing laws to permit the oil industry to co-operate intelligently to deal with overproduction of crude oil, Earl W. Sinclair, president of the Sinclair Consolidated Oil Corp., in an address in the Cyrus Fogg Brackett Lectureship, stated that the desperate situation creates an emergency which justifies and demands extraordinary relief.

"The solution of the problem of crude oil overproduction would automatically bring a solution of the major marketing problems," Mr. Sinclair said. "If relief through a modification of our laws is withheld, the possibility of correcting marketing abuses is remote and the continued overextension of marketing activities and the attendant evils is an open invitation for governmental interference and regulation of the industry.

"Jobber and dealer outlets which are maintained by excessively high guaranteed margins must be placed on their own responsibility. In this process those that have an economic right to live will survive and those that have not will fall by the wayside. The business of these unnecessary and wasteful duplications will be diverted to the remaining outlets and this increase in volume will be a powerful factor in reducing costs."

Commenting on gasoline taxation, Mr. Sinclair said the unreasonably high tax rates make evasion a highly profitable crime, difficult of detection, and an alluring opportunity to the bootlegger and the racketeer.

TEXAS SCHOOL FUND

AUSTIN, Tex., Mar. 12.—The supreme court has held that the school fund is entitled to half the bonus, one-half of the annual delay rental beyond its straight 10 cents an acre and that it owns one-sixteenth of the royalty in oil and gas produced on land in which the mineral had been reserved when the surface was sold. There are some 8,000,000 acres of school land thus involved, according to J. H. Walker, land commissioner.

The court affirmed the case of the Empire Gas & Fuel Co. et al vs. State et al, in which the lower court held unconstitutional an act of the last legislature known as Senate Bill No. 310.

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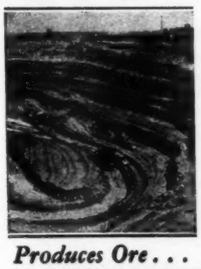

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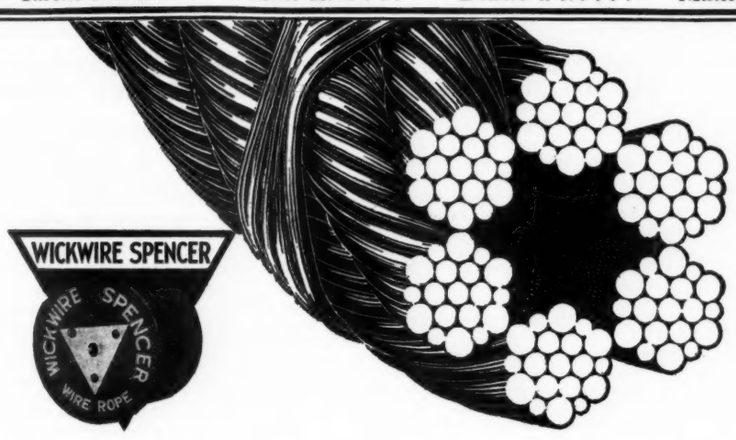

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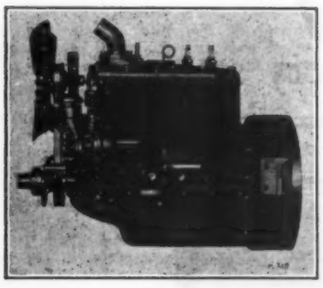
Oil Industry Equipment and Supplies

ADDS TO HERCULES LINE OF HEAVY-DUTY ENGINES

The Hercules Motors Corp., of Canton, Ohio, has added the following models to its line of heavy-duty 4 and 6-cylinder



oil field engines, thus giving a complete range of sizes of 9 to 175 horsepower:

Model	Bore	Stroke	Displacement
IXA	3	4	113.1
IXB	3¼	4	132.7

The two models are identical in general design and most of the parts are interchangeable, the only difference being in the bore sizes and the parts affected thereby. The maximum torque of the IXA is 76 pounds developed at 1,400 to 2,400 r.p.m., and the IXB is 90 pounds developed at 1,400 to 2,300 r.p.m. Both models peak at 3,200 r.p.m., the IXA developing 39½ horsepower, and the IXB 46½ horsepower at this speed.

To meet operating conditions calling for sustained high speed, special consideration has been given to valve cooling. The engines and power units are equipped as standard with a No. 5 standard S.A.E. bellhousing, but the No. 4 and No. 6 can be supplied upon request. Standard practice includes thermo-syphon cooling, but water pumps are available if specified. Either down-draft or up-draft manifolds are optional.

Lubrication is of the full force-feed type to the main bearings and connecting-rod bearings. The pump is located beneath the center main bearing and driven from the camshaft by helical gears. The shafts and gears of the oil pump are case-hardened. Oil pressure can be adjusted easily to suit operation requirements.

As in all Hercules engines, the IX series have the crankcase cast integral with the block. The crankshaft is 2 inches in diameter at the three main bearings, of which the front bearing is $1\frac{5}{8}$ inches long, the center bearing $1\frac{5}{8}$ inches long and the rear bearing $1\frac{5}{8}$ inches long. The connecting-rod bearings are $1\frac{3}{4}$ inches in diameter and $1\frac{1}{8}$ inches long, and the center to center length of the connecting rod is $6\frac{9}{16}$ inches. The pistons normally are of cast iron and carry three rings above the pin. The lowest of these rings is of the oil regulating type. The compression rings are one-eighth inch wide and the oil rings three-sixteenths inch. Piston pins are of nickel-molybdenum steel and are seven-eighths inch in diameter.

INTERESTING BOOKLET READY

An illustrated discussion of the Modified Fairchild Formula for determining metal thicknesses for cast iron pipe is a feature of a new booklet, "Specifications for Acipco Mono-Cast Centrifugal Cast Iron Pipe, Bell and Spigot, 1932," now being distributed free by the American Cast Iron Pipe Co., Birmingham, Ala. The new booklet is occasioned by the recently promulgated Federal specifications for bell and spigot cast iron pipe in which certain revisions of former requirements are contained.

AMONG THE EQUIPMENT HOUSES

C. E. Anderson has been appointed auditor of disbursements in the accounting department of the General Electric Co. to succeed the late F. D. Kamerer.

A motion picture laboratory is turning out 500,000 feet of 16 m.m. educational motion picture film for the Caterpillar Tractor Co. Nineteen different reels are being sent out to dealers.

G. Fred Sherman, formerly assistant sales manager of Tube-Turns, Inc., Louisville, Ky., has been appointed manager of sales of the forge fittings division of the Bonney Forge & Tool Works. Mr. Sherman will supervise the sales of Bonney weldolets, thredolets and welding flanges from the general offices in Allentown, Pa.

Hamilton Garnsey, Jr., has been appointed works manager of Goulds Pumps, Inc., Seneca Falls, N. Y., succeeding T. I. S. Boak, resigned. Mr. Garnsey joined the Goulds organization upon his graduation from Cornell in 1923 and spent two years at general foundry work. In 1923 he became foundry engineer and in 1929 assistant to the general manager.

The Brance-Krachy Co., Inc., Houston, Tex., has been appointed representative in the Houston territory for the O. C. Keckley Co., Chicago, maker of industrial equipment.

The Neilan Co., Ltd. (division of Mason Co.), and the Mason Regulator Co., have established their own joint office at 400 East Archer Street, Tulsa, with Gordon Thomason, control engineer, in charge. This new branch office will handle both Neilan and Mason instruments and regulators for the control of pressure, temperature and flow.

C. H. Crocker, comptroller of the Worthington Pump & Machinery Corp., has been elected vice president in charge of a newly organized unit called the Comptrollers' Division of the American Management Association.

HAYSTELLITE COMPOSITE ROD OFFERED BY HAYNES

The Haynes Stellite Co., Kokomo, Ind., has developed a special hard-facing rod for oil-well drilling tools called Haystellite composite rod, and application has been made for United States patents. This product consists of various screen sizes of sharp, irregular shaped grains of Haystellite, a cast tungsten carbide, uniformly distributed in a binding material.

Crushed Haystellite of screen sizes 4 on 8, 8 on 16, 10 on 20 and 20 on 30, and three types of binding materials—Haynes Stellite, Hascrome and high test steel are used. The list, which comprises 10 standard rods, includes practically every screen size of tungsten carbide and type of binding material required for facing the various types of drilling tools and for the efficient drilling of the various formations.

The three types of binding materials employed cover a range from the most wear-resistant to the toughest and strongest alloys. The rod in which the most wear-resistant alloy, Haynes Stellite, is used as a binding material, results in a slow and uniform wear and projection of the grains of Haystellite, while the high test steel binder results in rapid wear of the steel base between the grains of Haystellite and, therefore, a more pronounced projection of each grain.

Detailed information in regard to this product can be obtained by writing to the Haynes Stellite Co., or to the nearest of its district sales offices.

FILLING MACHINE ANNOUNCED

The problem of quick cleaning and "change over" of filling machines, which long has baffled makers of oils, greases and other lubricants, sold in cans, jars, and tubes of various sizes, prompted inventions of the "Simplex," filling machine developed by the F. J. Stokes Machine Co. of Philadelphia, Pa. Ten minutes for change of material and two minutes for change of container are ample, according to the manufacturer. Parts coming in contact with the material are quickly removable and, where advisable, extra interchangeable parts can be furnished. The "Simplex" fills oils, greases, etc., into cans, jars, tubes from one-quarter pint up to five gallons in size.

ACCURATE MEASUREMENT FEATURE OF NEW METER

A new meter, designed expressly for the petroleum industry, is a product of the Badger Meter Manufacturing Co., Milwaukee, Wis. Two engineering principles are combined to provide permanent accuracy and to eliminate the need for replacements caused by excessive wear. They are the "dwell principle" and the "principle of equalized pressures."

The first of these provides that the piston "dwell" at each end of the stroke for one-eighth of the cycle. This feature eliminates several problems which formerly made accuracy difficult to attain and upkeep costly. There is no problem of "dead center"; shock which resulted in wear is eliminated; the valve action is simplified; crank mechanism is eliminated; liquid speed is constant, and once set, the piston stroke is unchanged.

Through employment of the principle of equalized pressures, tightness of pistons is not a requisite for accuracy, a feature which is said to eliminate piston wear. Equal pressures are maintained on both sides of the four pistons, which work in pairs. Any leakage around the pistons is carried out through a regulator and returned to the supply line without going through the measuring device.

This meter not only assures the purchaser of gasoline at a filling station that he is getting full measure, but it protects the station owner as well, because he can use the same type of meter between the supply truck and his storage tank.

The new meter, adapted to measuring all petroleum products, is built in 10 sizes, from three-eighths inch outlet to 6-inch outlet. Complete information can be supplied by the manufacturer.

NEW TORNADO BLOWER

The Breuer Electric Manufacturing Manufacturing Co., 852 Blackhawk Street, Chicago, announces a new portable electric blower, the Tornado Model 4, for blowing dust out of motors and machinery parts, vacuum cleaning bins and stock rooms, and spraying insecticides, etc. This new blower is almost identical in design and construction with the large heavy-duty line of Tornado blowers.

LEADER BUBBLE CAP HAS CAP AND NIPPLE UNITED

The cap and nipple are built in one unit in the new bubble cap placed on the market by the Leader Iron Works, Decatur, Ill. In case replacement becomes necessary, it is needful only to remove the key, lift the entire cap and nipple unit out and set another in its place.

Among claims made for the Leader bubble cap are greater volumetric ca-

pacity, increased corrosion resistance and lower maintenance cost. It can be applied on cast iron or steel bubble trays. In cases where the liquid in the tower is not highly corrosive to steel, but the vapors are, this bubble cap used on a steel tray gives the advantages of a cast iron tray.

The standard Leader combined bubble cap and nipple is cast from a special iron alloy. It is said to withstand the ordinary corrosive effect of sulphur and other compounds, usually present in crude and pressure distillate, whether in the liquid or in the vapor stages.

FEED-WATER REGULATOR IS SELF-COMPENSATING

A new boiler feed-water regulator that is said to be self-compensating for variations in atmospheric temperature and boiler pressure, has been developed by G. W. Volz, and is to be manufactured and distributed by J. A. Campbell Co., Long Beach, Calif. This regulator has only one moving part and is automatic in action.

The Volz feed-water regulator consists essentially of two expansion tubes connected into a body casting and meeting at their outer extremities in a close return-bend. The lower tube is the working element and the upper tube the compensating element. The return bend carries a lug, to which the valve linkage is attached, and the expansion and contraction of the working tube induced by slight changes in the water-level are multiplied and translated into vertical movement, which is directly transmitted to the valve stem.

RECORDS ALL TRANSACTIONS

"Protection and Information That Are Making Money for Those in Automotive Lines," is the title of a new booklet issued for automotive service shops and filling stations by the Burroughs Adding Machine Co., Detroit, Mich. The booklet presents a modern plan for maintaining a continuous record of daily transactions. It is illustrated throughout with forms and specimen records, and discusses such phases of daily operations as the handling of cash sales, charge sales, payments received on account, money paid out, daily balancing, and the maintaining of monthly and yearly records. The idea presented is to centralize the recording of transactions. The plan provides for the identification of individual sales, and sets up definite safeguards against losses through errors in figuring, failure to record such items as charge sales or money paid out, or failure to register cash sales. Another subject covered in the book is the analyzing of sales by commodities and attendants. The book is sent free upon request to the company.

Timken-equipped "HIGHWAY" Trailer licking a tough pipe carrying job.

Wherever there are tough jobs to be licked in the oil fields, you will find Timken Tapered Roller Bearings helping to lick them. In well drilling and pumping machinery of all types; in auxiliary equipment of every description; the exclusive combination of Timken tapered construction, Timken positively aligned rolls and Timken-made steel, plus the greater load-carrying area of Timken line contact, assures continuous full capacity of Timken Bearings for radial loads, thrust loads or both together in any proportion.

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KENNEDY Drilling Valves, like all Kennedy Valves and Pipe Fittings for the oil industry, are built with an unusually generous margin of strength. Their sound metal, sturdy design, heavy proportions and careful workmanship combine to make them ideally suited for the extreme pressure and severe service at which they operate.

These valves are made in a variety of patterns with screwed or flanged ends and with or without bypass. Other Kennedy Products for the oil industry include 400-lb., 700-lb., 1000-lb. and 1600-lb. test gate valves, pipe line valves, general service valves, standard and extra heavy cast iron flanged fittings and companion flanges, and malleable iron screwed pipe fittings.

The Kennedy Valve Mfg. Co., Elmira, N. Y.

Dealers in principal oil centers.

KENNEDY

VALVES~PIPE FITTINGS~FIRE HYDRANTS

NO-OX-ID IRON-RUST TRADE MARK

The Original Rust Preventive

Service Reports on Line Inspections

—and that's where the story is told

Report of Dearborn Representative A. B. Burns, Los Angeles office:

"These lines were coated with NO-OX-ID, Wrapper and Service Coat—three years ago last May. In the presence of the pipe line representatives of these companies, also several others interested in underground pipe line protection, these lines have been opened up. The protective coating was just the same as when put on and all lines were one hundred percent. The results are, of course, very gratifying."

Report of Dearborn Representative J. T. Harris, Denver office:

"An inspection was made of the 4" pipe line which we coated two years ago. We had three openings dug and found conditions perfect. Where we had used both the Asbestos Wrapper and NO-OX-ID 'G Special', the condition was perfect. At points where NO-OX-ID 'G Special' was used only, the material was still present, and at all points the pipe was as good as the day it was put in. A very favorable report was made."

Report of Dearborn Representative I. L. Yetman, Oklahoma City office:

"Inspected six-inch line coated with NO-OX-ID in 1927, both pipe and material look good. Also inspected eight-inch line coated with some black material same year. This will have to be reconditioned this Spring. Have hopes of getting this job."

Report of Dearborn Representative E. M. Welch, Pittsburgh office:

"Mr. B———— has been here three years and has examined NO-OX-ID coated pipe laid before his time and finds coating as good as when laid. Has a stream crossing coated with just NO-OX-ID one year ago that he is watching. It is still as good as new."

These are typical of the results NO-OX-ID is producing. Why not put it to work for you? Recommendations and estimates submitted gladly. Dearborn products serviced by experienced representatives. Inquiries invited.

DEARBORN CHEMICAL COMPANY

"A House of Chemical Engineers" In Its Forty-fourth Year of Service to Industry.

310 S. Michigan Ave., Chicago 807 Mateo St., Los Angeles

205 E. 42nd St., New York

Canadian Offices and Factory: 2454-2464 Dundas St. West, Toronto

The NO-OX-ID MASTER COAT

Oil Industry Equipment and Supplies

LUBRICATOR PARTS ARE REMOVED WITHOUT STOP

Manzel Brothers Co., Buffalo, N. Y., announce a new model force feed lubricator. This model 25 has been designed to operate successfully against the higher steam, gas and air pressures now used

Four-feed "Manzel" model "25" lubricator.

in the oil fields. While all working parts are enclosed in the reservoir, out of dust and dirt, and work in the oil continually, any unit may be taken from the reservoir at any time by simply removing two screws and without stopping the lubricator or the equipment on which installed, or, in the case of multiple feed lubricators, without interfering with any other units.

In addition the discharge valves are placed in individual cages and may be removed for repairs, cleaning, or replacement with new ones if desired, without even removing the unit from the reservoir.

Each pumping unit is independently regulated and is capable of fine adjustment. The ability to feed minute quantities of oil against high gas, steam or air pressures makes these lubricators especially satisfactory on compressors or on gas and air-lift equipment.

An extra large filling cup permits easy refilling of the reservoir.

These lubricators are somewhat larger than previous Manzel models, thereby giving greater reservoir capacity and making frequent fillings unnecessary. The range of feed is somewhat greater, permitting the feeding larger amounts of oil to the cylinders of heavy duty pumps or engines which require it for efficient lubrication.

STARTING OF ENGINE IS FACILITATED BY PRIMER

The P-O-L primer, a unique device for facilitating the starting of gasoline engines, either automobile or stationary, has been introduced by the Linde Air Products Co., 30 East Forty-second Street, New York. The primer is a simple and easily installed device for introducing acetylene, a highly combustible gas, into the cylinders of an internal combustion engine so that it will start easily and quickly. It provides a positive, safe and economical method of starting gasoline engines.

The primer consists, essentially, of a special stem type brass primer valve, a Prest-O-Lite pressure regulator and 10 feet of one-quarter inch brass tubing with compression unions. The assembly is used in conjunction with the ordinary Prest-O-Lite tanks that are extensively used for headlighting systems on trucks and tractors, and for operating a wide variety of heating, soldering and brazing torches.

NOTES ABOUT TRADE LITERATURE

The Hays Corp., Michigan City, Ind., is sending on request its new catalog, PGA-32, which describes and illustrates Hays indicating and recording gauges, featuring pointer gauges for draft, pressure, differentials and temperature.

Edison permissible electric hand lamps is the subject of a 4-page bulletin issued by the Mine Safety Appliances Co., Pittsburgh, Pa.

The Tag-Mono indicator-recorder catalog, prepared by the C. J. Tagliabue Manufacturing Co., Brooklyn, N. Y., is a 16-page booklet illustrating and describing this new instrument for boiler flue gas analysis.

The Wagner Electric Corp., 6400 Plymouth Avenue, St. Louis, Mo., has issued a loose-leaf bulletin sheet on type RG brush-riding repulsion-induction motors. Copies of the sheet will be sent to inquirers who ask for Bulletin 173, Part 4.

"International Speed Trucks," the latest catalog issued by the International Harvester Co. of America, Chicago, contains illustrations and descriptions of the company's line of speed trucks, capacities of which range from three-quarters of a ton to 3 tons.

The Hazard Wire Rope Co., Wilkes-Barre, Pa., is distributing an 18-page booklet in colors entitled "Twelve Reasons Why You Save Money with Lay-Set Preformed Wire Rope."

SYSTEM FOR REMOVING PARAFFIN INTRODUCED

The Brewster Co., Inc., Shreveport, La., manufacturer of oil field tools, has announced a system for removing paraffin from any size tubing in flowing or pumping wells. The system is designed to introduce hot water, oil, gas, air or any chemical treating fluid inside or outside the tubing at the point where the paraffin starts to form. This method, intended to enable the operator to apply the treating agent directly where the trouble exists, is said to remove one of the most serious difficulties with which operators have had to contend in dealing with this problem, and greatly to increase the efficiency of the treating agent in cutting, melting or dissolving the paraffin, regardless of the size of the tubing or the distance from the surface to the spot where the paraffin forms.

It is recognized that in the absence of unusual conditions, flowing wells will continue to flow if paraffin is kept out of them so long as there is enough gas pressure to make them flow. With the paraffin trouble eliminated, sucker rods need be pulled only when the cups are cut, when it is necessary to change plungers or when the rods part or break. Fishing jobs are made easier, as there is no paraffin in the tubing to retard the rod socket in going down to the fishing job.

It is pointed out by the Brewster Co. that in using this paraffin removal system a treating fluid which cuts or dissolves paraffin in the tubing will also clean out the flow line and all connections. Particulars regarding the system may be obtained by addressing the company.

AERATOR PANELS TAKE THE PLACE OF LOUVERS

Of interest to cooling tower users is the new tower perfected and released for manufacture by the Fluor Corp., Ltd., Los Angeles, Calif. The appearance of this tower is unlike that of any previously manufactured. A construction feature is the vertical aerator panels which replace the louvers found in an ordinary cooling tower.

It is stated that these panels make it practically impossible for water to escape from the tower even in case of high wind. The tower is constructed with practically the same sturdy framework as that of previous Fluor towers. In addition to this the new taper construction, widening from top to bottom, adds a factor of stability.

ADJUSTABLE ORIFICE IS INTRODUCED BY BAILEY

For fluid meter installations, where it is desirable to obtain accurate measurements over a wide range of capacity, the Bailey adjustable orifice has been designed by the Bailey Meter Co., Cleveland, Ohio. This device is particularly suitable for use with meters measuring gas or low-pressure heating steam, since in these services the desired capacity is often dependent upon the season.

The adjustable orifice consists of a flanged body with integral meter connections. It can be installed readily in a steam, water or gas line and connected to any differential head type of fluid meter. It functions like the fixed type of Bailey segmental orifice. A micrometer adjusting screw permits setting the height of the gate segment within .001 of an inch. When it is advisable to change the capacity of the meter it is simply necessary to set the micrometer screw at the reading corresponding to the desired maximum capacity, as obtained from curve sheets furnished with the orifice.

The adjustable orifice permits changing the maximum capacity of the meter 40 to 1, and the change may be made in a few minutes without disrupting meter operation or diverting the flow through a bypass line.

NEW GASKET MATERIAL

A new gasket material, moisture proof and highly oil resistant, has been announced by the General Electric Co. This material, known as No. 1,000 Compound, is recommended especially for applications where the primary purpose of the gasket is to exclude moisture. It is a white, odorless, sulphur-free rubber compound, available both in sheets and molded shapes. It is extremely tough and strong, very flexible, requires no sticker, and can be used repeatedly in testing work, as well as in permanent joints. The manufacturer says it is unaffected by exposure to the weather, and when under compression in properly made joints is not attacked by cold oil. In contact with hot oil it is said to be practically unaffected where inclosed in recessed joints under compression. Mildly alkaline solutions, such as those derived from portland cement, or dilute acid solutions have no apparent effect on this material. This material has been found especially useful in making joints in porcelain and metal assemblies, such as in dry-type bushings for outdoor transformers and oil circuit breakers. It is used effectively for sealing of gas-filled machinery.

MEN KNOWN *in* THE EQUIPMENT FIELD

Clarence E. Searle, for 17 years general representative in charge of sales for the Allis-Chalmers Manufacturing Co., recently was made vice president in

Clarence E. Searle

charge of sales for the Worthington Pump & Manufacturing Corp., Harrison, N. J.

Mr. Searle became associated with the Allis-Chalmers organization in 1908, prior to which time he was with the Western Electric Co. and the Fort Wayne Electric Works (a division of the General Electric Co.). After one year as a sales representative in the Milwaukee office of Allis-Chalmers, he became district manager of that office in 1910. He filled that position until 1915, at which time he was made general representative in charge of sales, a position he held until appointed to his present office with Worthington.

FACE-PIECE OF MASK IS FITTED SNUGLY TO FACE

E. D. Bullard Co., manufacturer of safety equipment, announces the new Bullard gas mask for industrial use. The mask is made with a one-piece molded face-piece, scientifically shaped to conform to any wearer's face. There are no splits or patches in the rubber. Instead of requiring tension to hold the face-piece tightly in place, the molded face-piece on the Bullard mask is suspended from the top of the head and held snugly by light rubber straps which run around the head with a minimum tension.

The straps are adjusted as an ordinary belt, and once the adjustment is made it is permanent. A special neck-snap permits quick and easy removal of the face-piece. The rubber used in the face-piece is specially compounded to prevent oxidization or loss of elasticity. Special construction of the castings connecting the face-piece with the flexible hose to the canister assures low breathing resistance.

The face-piece is equipped with triangular eye pieces to give maximum horizontal and vertical vision. The eye pieces will not fog on the inside during inhalation or exhalation. Eye pieces are quickly and easily removable and replaceable.

Carbohydrate Theory of Origin of Oil

Mechanism of Chemical Reactions Involved in Metamorphosis of Marine Vegetation to Produce Petroleum

Abstract of paper by J. E. Hackford, B.Sc., F.I.C.*

Among the several theories at present existent as to the origin of petroleum oils, one of general acceptance was that some types of petroleum had been derived from the decomposition of marine vegetation; but the mechanism of the chemical reactions involved in that metamorphosis had not hitherto been fully investigated. No facts supporting the suggestion that oils were produced by the natural decomposition of algae had yet been brought to light, nor indeed, had oil been produced from algae in a manner in any way similar to processes, or under conditions resembling, those obtaining in nature.

Mr. Hackford said he had been able to establish:

1. The formation of oil from algae by processes similar to those obtaining in nature.

2. The presence of the decomposition products of algae in both naturally occurring oils as obtained from wells, and also from seepage oils and bituminous products.

3. The reconversion of oils, various oil seepages, and some seepage products into bodies closely resembling, and in some instances identical with the constituents and decomposition products of algae.

4. The formation of oils and bitumens from sugars.

5. The reconversion of oils into bodies resembling bitumens, which upon hydrolysis yield sugars.

While the above work supported the algal theory of the origin of some classes of petroleum, the data obtained showed that oil and bitumen were in the main produced from the sugars resultant upon the hydrolysis of algae. On that account it might be advisable to rename the vegetal theory, and call it "The Carbohydrate Theory of the Origin of Oil."

Protobitumen

The term "protobitumen," as employed by him, was a chemical definition, and must not be confused with the commercial definition as accepted by the international committee for the standardization of nomenclature and tests of road materials, and by the American Society for Testing Materials. This reads:

"Bitumens—Mixtures of hydrocarbons of natural or pyrogenous origin or combinations of both (frequently accompanied by their nonmetallic derivatives) which can be gaseous, liquid, semisolid or solid, and which are completely soluble in carbon disulphide."

Protobitumen is a partially reduced carbohydrate which, upon further or total reduction, yields oil. Conversely, protobitumen is a partially reduced carbohydrate formed by the oxidation of oil. Naturally occurring protobitumens may contain other decomposition products of algae, such as metallic salts and organic derivatives of sulphur and nitrogen, according to the type of the parent algae.

It is possible, and indeed probable, that the chemical definition of protobitumen as given above will be found to apply also to bitumens, which may have been derived from other sources. In the meantime, however, it is limited to the bituminous material derived from algae, and to the oxidized products of the oils obtained from them. This procedure is adopted because there is at present no real chemical evidence to justify oils and bitumens of animal or other origins being included.

Oil—The term oil as used herein denotes a mixture of hydrocarbon oils, and such alcohols, ketones, aldehydes, carboxylic and poly-hydroxy-carboxylic acids which yield hydrocarbons upon reduction. These latter compounds are found in some of the well oils and seepage oils herein discussed.

Asphaltenes—That portion of bitumen which is soluble in carbon disulphide, but insoluble in ethyl ether.

Kerotenes—That portion of bitumen or protobitumen which is insoluble in carbon disulphide.

Kerols—That portion of the kerotenes which is soluble in both chloroform and pyridine.

Keroles—That portion of the kerotenes which is soluble in pyridine, but insoluble in chloroform.

Kerenes—That portion of the kerotenes which is insoluble in organic solvents.

Kerites — Naturally occurring bitumens and protobitumens composed appreciably or wholly of kerotenes.

Algarose is chemically pure protobitumen prepared by the acid hydrolysis of sugars. It reduces Fehling solution, and is free from metallic salts and organic derivatives of sulphur and nitrogen.

Algarites are naturally occurring protobitumens, composed chiefly of algarose, together with the metallic salts, sulphur, and the nitrogenous, organic derivatives simultaneously formed during the acid hydrolysis of algae.

It occurs in nature as a natural bitumen, or highly bituminous shale in the form of McKittrite, and is capable of yielding oil by reduction.

Fucose is the sugar obtained by hydrolysing the polymer fucosan, which is a component of the cell wall of marine algae.

Fucosite is a naturally occurring mineral, which is composed of the lesser water-soluble portions of seaweed. The structure has almost been entirely lost by the action of bacteria and oxygen. It has been called "fucosite" because it contains a sugar complex which is liberated by either alkaline or acid hydrolysis. During the latter process oil and algarose are formed. In the samples hereinafter quoted the fucosite mainly consists of a fucose pentosan.

Elkerite and pseudo-fucosites—Elkerite is a naturally occurring bitumen formed by the slow oxidation of oil. It is a fucose pentosan—hence the class term "pseudo-fucosite" to distinguish it from the seaweed complex, fucosite. It is built up from oil, cf. algarite, which is a decomposition product of algae.

The Algae Theory

Referring to the formation of oil by the natural decomposition of algae, the author said that the algae theory of the derivation of petroleum as distinct from the general term "vegetable" theory could be said at the present date to have been only a considered possibility. Both of those theories had been obscured by the "inorganic" and the "animal remains" hypotheses, which might be criticized as being supported by very meager experimental chemical evidence.

Confirmatory evidence of the production of oil from algae was given by the author in 1922, who showed the similarity of the metallic contents of algae and of oil, and commented upon the fact that iodine, bromine, phosphorous and ammonium salts were also common. The low nitrogen content of oil followed from the low nitrogen content of the algae, while the low phenol and furfurol content of the oil was attributed to the small percentage of cellulose present in algae.

It occurred to the author that organic decomposition of an alkaline solution of seaweed by the action of anaerobic bacteria might take place in media other than the alkaline clays suggested by certain chemists. It appeared to him that the process was essentially one of hydrolysis, in which the bacteria firstly hydrolyzed the fucosan or organic matter of somewhat similar chemical constitution, forming sugars—and that by further action the sugars broke down and gave rise to methane as recorded. It was found that an aqueous extract of algae (laminaria) possessed an alkaline reaction. Upon exposure to the atmosphere a growth (cladothrix dichotoma) formed, which acted upon the calcium salts of the ethereal sulphonic acids present, decomposing them with the precipitation of calcium sulphate in the form of anhydrite. At the same time the nitrogen compounds were decomposed with the formation of tertiary amines and ammonium salts. After three or four days the aqueous seaweed extract became strongly acid, due to the formation of free sulphuric acid. It was also observed that by blowing the aqueous extract with air for some time that a similar kind of reaction took place.

Acid Hydrolysis

Assuming that in nature hydrolysis took place over a long period of time, the aqueous extract of seaweed was submitted to prolonged acid hydrolysis. (Acid hydrolysis was chosen because of the formation of free sulphuric acid by the cladothrix dichotoma and also by oxidation.) Both oil and a bituminous product were formed during acid hydrolysis of the aqueous extract of algae, but not during alkaline hydrolysis. During the acid hydrolysis, the calcium salts of the sulphonic esters were decomposed with the precipitation of calcium sulphate, and the formation of tertiary amines and oils similar in character to naturally occurring petroleum oils. Those oils and the bituminous products formed the bulk of the decomposition products of the acid hydrolysis of the algae. It was also found that sugars themselves were decomposed during acid hydrolysis, yielding both oil and protobitumen.

In connection with the presence of the intermediate products of the decomposition of algae in naturally occurring oils and seepages, the author recently had occasion to make a chemical examination of certain seepages of oils and bitumens and the oils from certain wells situated in an arid region of California. The rainfall was given as being less than 2 inches per annum, while the day temperature reaches 110° to 120° F. As in the case of the nitre beds of Chile, where the nitre persisted because of the lack of water to wash it away, that particular region of California was peculiar, in as much as the sands contained appreciable quantities of water soluble substances related to and coexistent with the oil and bituminous seepages found there.

There was a large dyke of solid bitumen running up the side of a cliff for more than 1,000 feet. Upon analysis the whole of the organic part (90 per cent) of that seep was soluble in 1 per cent solution of soda. Upon hydrolysis the solution yielded sugars of which the pentose arabinose predominated. Tertiary amines and ammonium salts were also formed and, upon subsequent acid hydrolysis, oil resulted which could be isolated from the decomposition products.

In another seepage oil, gas and bitumen existed side by side in a sand which contained relatively large quantities of free sulphuric acid. Upon extraction with water the sand gave a brown acid solution, which contained both free sulphuric acid and the sodium and calcium salts of the ethereal sulphonic esters. Upon hydrolysis l-arabinose, tertiary amines, ammonium salts and oil were formed. When the aqueous solution was exposed to the atmosphere a mould (cladothrix dichtoma) readily formed upon the surface, and after a few days a heavy precipitate of calcium sulphate was deposited in the form of anhydrite.

Contents of Seepages

All the seepages found contained an insoluble material, which swelled up in water like glue, and which could be hydrolyzed yielding sugars, etc., as above. Traces of that substance were also found in the basic sediment of the crude oils found in the deep wells of the district, while the water accompanying the oil contained comparatively large amounts of sugars and traces of the salts of the naphthenic acids.

The fuel oil residue of the deep well oil yielded a similar material upon oxidation. On extracting those residues with water at a steam pressure of 25 pounds per square inch, a water soluble fraction was obtained, which upon acid hydrolysis yielded sugars, etc., as above.

As regards the conversion of oil into bodies resembling the fucose-pentosans, Mr. Hackford said he had already been recorded that asphaltenes changed into kerols and keroles when subjected to gentle heating over a prolonged period of time. It had since been discovered that oils underwent a similar change and that oxidation played the dominant role in that conversion. That conversion was the reverse of that which obtained in nature, whereby algae, by a process of acid hydrolysis, underwent a form of degradation or reduction which resulted in the loss of oxygen. The kerols and keroles so formed resembled some naturally occurring seepages, and that upon acid hydrolysis they yielded sugars, furfurol, tertiary amines, ammonium salts, etc., besides possessing other points of similarity. Those artificial kerotenes (the class name, including kerols and keroles) also occurred in nature. Twenty years ago oil gushers flooded the sands in various parts of the Elk Hills, California, and that pseudo-fucosite now abounded in the sands of the district. He had named that type of bitumen "elkerite," as it was a naturally occurring product. As a class name the term "pseudo-fucosan" was suggested as it yielded pentose sugars upon hydrolysis, while the general term "pseudo-fucosite" was used to designate that naturally occurring type of product. Elkerite was therefore a pseudo-fucosite, produced by the oxidation of oil.

The author then presented a vast amount of experimental data resulting from his experiments on the formation of oil by the natural decomposition of algae; the nature of the products of the acid hydrolysis of algae; the presence of algaeic decomposition products in natural oils and seepages; and the conversion of oil into bodies resembling the fucose-pentosans.

The author's conclusions were that algae were partially soluble in boiling water, yielding alkaline solutions. Those alkaline solutions contained sugars formed by the hydrolysis of the fucosan present in the algae, and alkaline might be converted into gases by the action of anaerobic bacteria.

Both bacterial action and oxidation, however, caused a change in the reaction of the alkaline solution, due to the formation of free sulphuric acid. At that stage the free sulphuric acid became the hydrolyzing agent, and by its agency the fucosan was converted into sugars and the calcium salts of the ethereal sulphonic esters. The free sulphuric acid decomposed the sugars at low temperatures with the formation of algarite and an unstable variety of polyhydric fatty acids, which easily lost both their acidic radicle and part or whole of their oxygen, ultimately yielding hydrocarbon oils.

Calcium Salts

The calcium salts of the ethereal sulphonic esters were decomposed by water with the formation of mono and dihydric alcohols—free sulphuric acid and calcium sulphate. That continued formation of free sulphuric acid accelerated the hydrolytic process. As the esters dis-

*From the Petroleum Times, London.

appeared the tertiary amines made their appearance, and after that the ammonium salts were formed. Those bodies were also unstable and readily yielded oil which mixed with the mono and dihydric alcohols formed by the decomposition of the calcium sulphonic esters. The mixture of oils thus obtained contained naphthenic acids, organic sulphur and nitrogen compounds, traces of very many of the rarer elements and other decomposition products of the algae. In fact, the mixture of oils possessed the properties of naturally occurring petroleum oils. The yield of oil and bitumen calculated on the water-soluble fraction of algae was high, representing a minimum of 10 per cent of oil and 43 per cent of bitumen.

As the migration of underground waters was established, then it had to be conceded that the soluble fractions of algae, or the oil-forming substances could also travel in aqueous solution from place to place. Those solutions then decomposed at leisure in some convenient geologic trap, whether that were on the original site of the deposition of the algae, or at some distance therefrom. Upon decomposition such liquors precipitated algarite and calcium sulphate over the path of their travel, and at the same time oil was produced. It might happen that those occurrences were simultaneous, or it might be that the algarite and calcium sulphate were precipitated first and that the decomposition of the liquors was completed in another site.

In the case of McKittrite the algarite had been precipitated in bulk upon and in a diatomaceous earth, but in other cases it was possible that the algarite might be distributed throughout beds of an argillaceous nature. In the dried and metamorphosed condition such beds would be known as "shale" and the algarite as "kerogen."

As to the bitumens it appeared that the view held at the present time that bitumen was an evolution product of oil had to be modified in the light of the evidence now available. So far bitumen had been considered to have been derived from oil by such processes as concentration, polymerization and oxidation. They now had evidence that bitumens existed such as the fucosites and the algarites, which were capable of forming oil by degradation processes.

Those processes had been described in detail and it had been shown that tertiary amines, ammonium salts, and sugars were formed as intermediate products, together with furfurol in smaller quantities. The major part of the sugars formed were pentoses, and arabinose predominated. They then had still another form of bitumen in elkerite. That bitumen was made in nature by the slow oxidation of petroleum oil at very moderate temperatures under conditions which existed at the present day at Elk Hills. That insoluble bitumen—a kerite—was deposited throughout certain sands, having been formed in the sands saturated with oil within living memory. Some of those sands were very acid, containing free sulphuric acid generated by the decomposition of the fucosites present, and that acid was capable of decomposing elkerite reforming the original type of oil.

Elkerite might be considered either as an oxidation product of oil, or as a body from which oil was produced by degradation. It had all the properties of a fucosite, it could be hydrolyzed, and yielded pentoses as intermediate products, and oil as one of the final products, thus exhibiting a fucosite-oil cycle.

Summing up, Mr. Hackford said that it had been shown that:

1. Oil and bitumen were products resultant upon the prolonged acid hydrolysis of algae at low temperatures.

2. Oil and bitumen could be produced by the acid hydrolysis of the decomposition products of algae, e.g., the sugars and the calcium salts of the ethereal sulphonic esters.

3. By the acid hydrolysis of algae a bitumen was produced—algarite—similar in properties to the naturally occurring bitumen McKittrite.

4. By the acid hydrolysis of sugar a pure form of the above algarite was formed—algarose.

5. Oils and bitumens were not formed by the alkaline hydrolysis of algae.

6. Some oils and bitumens contained the same range of metallic salts as algae.

7. Naturally occurring oils and seepages contained the decomposition products of algae in some instances.

8. Some oils could be oxidized into fucosite, which upon hydrolysis yielded sugars.

Discussions

J. McConnell Sanders, presiding at the meeting of the Institution of Petroleum Technologists at the Royal Society of Arts, London, said the author had shown a direct relationship between carbohydrates and hydrocarbons.

J. McConnell Sanders said the author had shown a direct relationship between carbohydrates and hydrocarbons.

He noticed that the author had rather stressed the importance of the mineral constituents of seaweeds as evidence of the similarity to the oils and bitumens. He could not help feeling that the analogy might be somewhat overstrained. It was well known that in marine algae there was a certain biological succession in the mineral substances which they assimilated, not only in amount, but also as regards the actual nature of the elements utilized by the plant during its life. He had little doubt that a spectroscopic examination of a fragment of driftwood from the Brighton foreshore would reveal practically all the elements recorded by Mr. Hackford, but he would hesitate to connect that circumstance with the origin of all the elements in the table. This was rather stretching the analogy farther than it should be stressed, but it was the idea he had in his mind.

Dr. A. Wade congratulated both the author and the institution on Mr. Hackford's fine paper. He was struck by the way in which the author had indicated not only the building up of petroleum from the algae, but the reverse process. He had performed the whole cycle of operations, beginning with one simple element and producing oil, and then going right away back to the sugars and so forth. In the course of that cycle of operations there were numerous points which might very well form the foundation for a number of very important researches, not only from a purely scientific point of view but from an economic point of view.

He supposed that all members understood from the paper that the author was only dealing with one small part of the formation of petroleum. The paper did not mean that all kinds of petroleum necessarily originated from the algae, but that there might be many other sources of origin from which, perhaps, the same or a similar cycle of events might take place, not only of marine origin but possibly of terrestrial origin.

Prof. A. W. Nash, in a communication, wrote that the author was to be congratulated on a remarkable thesis involving not only the collection of facts from a wide range of applied science, but also a considerable amount of experimentation.

The author appeared to have neglected the important part which micro-organisms played in the slow decomposition of organic matter. Undoubtedly, varied products of decomposition could be formed from the same parent material by the action of different micro-organisms. Again, was there justification for assuming that petroleum was derived from algae because the sugar from marine algae might be converted to algarite by hydrolysis, a certain oil might be oxidized to fucose pentosan, and fucose pentosan might be hydrolyzed to sugars?

The author had made out a very strong case for the conversion of algae into a certain type of bitumen, but his theory that bitumen was an intermediate step in the generation of petroleum was not so convincing.

California Bitumens

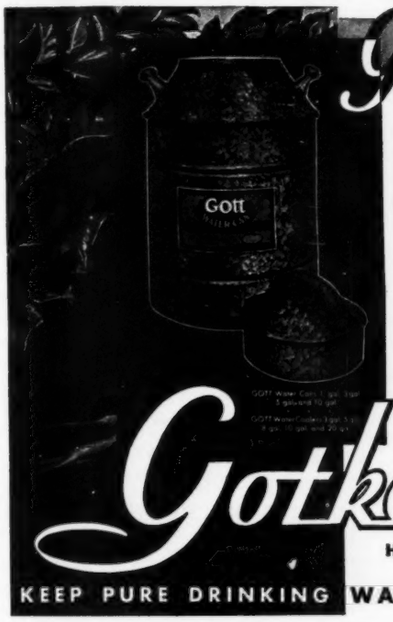
The statement that a Californian bitumen was largely soluble in 1 per cent soda solution and that on hydrolysis the solution contained the pentose arabinose was most important evidence in connection with the author's theory; also the similarity in behavior of fucosite and the bitumens under investigation was most convincing. However, had the author treated any other bitumen with a 1 per cent soda solution so that this property might be generalized?

One could only wish for more evidence upon the relation of these bitumens to natural petroleum oils in general. Bitumens usually needed hydrogenation under elevated temperature and pressure to yield oils of similar nature to petroleum. The presence of sugars and ammonium salts in well waters and of carbon dioxide in natural gases would not be accepted as sufficient evidence by many.

The fact that algae contained the same range of metallic salts as some oils and bitumens was difficult to accept as proof of the algal origin of those particular oils and bitumens, because it was a well-known biological fact that algae would adapt themselves to varying conditions. The author himself stated: "Algae are plants which absorb their mineral constituents by their whole surface from the waters in which they live."

The author had, very ably, presented facts to prove that certain bitumens owed their origin largely to algae, yet sufficient evidence had in the past been put forward to suggest that some oils might owe their origin to fish and other lower animal organisms. It would be hard to imagine large algae deposits without animal deposits also, and the relative proportions of the parent material would, doubtless, affect the nature of the oils produced on decomposition, apart from any effect which micro-organisms might have.

Although Mr. Hackford had explained the origin of certain bitumens from algae, he felt that the animal origin theory must not be disregarded entirely. A valuable link in the chain of evidence would be the discovery of oil deposits in the various stages of development from the bitumen, as suggested by the author.



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Oklahoma-Kansas and Eastern Pipe Line Report

OKLAHOMA-KANSAS
Pipe Line Statement for January

Runs

	Month (bbls.)	Dy.av. (bbls.)
Prairie P. L. Co.*	579,700	18,700
Gulf P. L. Co.	1,524,401	49,174
Texas P. L. Co.	543,721	17,539
Magnolia P. L. Co.	1,579,836	50,963
Empire P. L. Co.	2,010,159	64,844
Cosden P. L. Co.	613,381	19,786
Stanolind P. L. Co.*	3,162,000	102,000
Oklahoma P. L. Co.	2,069,871	66,770
Other lines	4,774,000	154,000
Total January	16,857,069	543,776
Total December	19,796,955	638,611
Difference	2,939,886	94,835

Shipments

Prairie P. L. Co.	1,862,336	60,075
Gulf P. L. Co.	1,792,661	57,828
Texas P. L. Co.	643,195	20,748
Magnolia P. L. Co.	965,558	31,147
Empire P. L. Co.	1,870,655	60,344
Cosden P. L. Co.	688,035	22,195
Stanolind P. L. Co.	3,335,755	107,605
Oklahoma P. L. Co.	2,091,388	67,464
Other lines*	3,007,000	97,000
Total January	16,256,583	524,406
Total December	19,355,129	624,359
Difference	3,098,546	99,953

Stocks

	Bbls.
Prairie O. & G. Co.*	35,341,000
Gulf P. L. and Gypsy Oil Co.	7,726,629
The Texas Company	3,664,036
Magnolia Petroleum Co.	8,474,950
Empire P. L. Co.	4,729,405
Mid-Continent Petroleum Corp.	3,331,484
Stanolind Crude Oil Pur. Co.*	16,250,000
Oklahoma P. L. Co.	1,278,698
Carter Oil Co.	6,161,813
Other lines*	15,166,000
Total January	102,124,015
Total December	102,072,255
Difference	52,760

*Estimated.

EASTERN PIPE LINE REPORT FOR MONTH OF JANUARY

Runs From Wells

In the following table will be found the regular receipts from wells by various pipe lines in New York, Pennsylvania, West Virginia, Ohio, Kentucky, Illinois, Indiana and Michigan for December and January:

	Dec.,'31	Jan.,'32
Nat. Transit	134,728.53	132,346.98
S. W. Pa. P. L.	78,639.10	64,883.40
Eureka P. L.	304,834.50	264,733.46
Buckeye P. L. (Macksburg)	276,673.59	231,436.17
Buckeye P. L. (Cleveland)	12,125.02	12,765.55
Buckeye P. L. (Lima, etc.)	77,185.73	70,902.02
Indiana P. L.	2,581.64	2,957.69
N. Y. Transit	42,593.82	42,434.50
Tide Water P. L.	24,880.76	21,527.15
Pure Oil	350,421.59	343,184.55
Stoll Oil Ref.	36,806.03	31,955.78
Bradford Tran.	422,865.63	409,404.66
Total	1,916,885.82	1,658,531.92
Daily average	61,835.03	53,501.03

Petroleum Deliveries

The following tables exhibit the shipments or regular deliveries of various pipe lines in New York, Pennsylvania, West Virginia, Ohio, Kentucky and Indiana for December and January:

	Dec.,'31	Jan.,'32
Nat. Transit	554,540.59	546,544.24
S. W. Pa. P. L.	426,018.53	327,706.71
Eureka P. L.	318,074.34	266,906.78
Buckeye P. L. (Macksburg)	233,257.65	247,543.60
Buckeye P. L. (Cleveland)	1,769.74	1,710.80
Buckeye P. L. (Lima, etc.)	1,578,295.69	1,483,164.35
Indiana P. L.	738,240.58	726,776.96
Southern P. L.	61,182.44	45,091.54
N. Y. Transit	176,524.14	160,691.41
Northern P. L.	134,129.64	167,659.81
Tide Water P. L.	572,501.01	582,162.04
Pure Oil	330,150.34	322,591.72
Bradford Tran.	448,373.88	404,570.61
Tuscarora	330,473.61	305,988.46
Total	5,463,472.00	5,782,109.33
Daily average	176,241.03	186,551.91

Gross Stocks

The gross stocks held by various pipe lines in the oil producing sections of New York, Pennsylvania, West Virginia, Ohio, Indiana and Kentucky at the close of December and January:

	Dec.,'31	Jan.,'32
Nat. Transit	647,268.73	708,300.22
S. W. Pa. P. L.	454,609.86	452,222.86
Eureka P. L.	1,205,561.50	1,218,191.97
Buckeye P. L. (Macksburg)	298,989.13	265,000.33
Buckeye P. L. (Cleveland)	45,401.41	35,126.48
Buckeye P. L. (Lima, etc.)	2,890,304.17	2,936,849.21
Indiana P. L.	543,883.89	520,692.84
Cumberland P. L.	64,500.81	64,500.81
Southern P. L.	229,411.72	258,415.33
N. Y. Transit	145,567.39	198,406.61
Northern P. L.	214,690.06	234,194.85
Tide Water P. L.	1,107,832.07	974,418.35
Pure Oil	803,723.79	887,230.61
Tuscarora	10,793.98	10,920.81
Bradford Tran.	326,488.02	156,443.22
Total	9,119,032.53	9,023,914.45
Decrease		95,118.08

Grades of Oil

The following table shows the amount of the different grades of oil held by the Eastern pipe lines at the close of December and January, showing gross stocks of the above fields:

	Dec.,'31	Jan.,'32
Pennsylvania	3,289,870.05	3,219,630.31
Lima	598,134.96	602,805.09
Kentucky	74,898.32	74,908.32
Mid-Continent	4,422,734.01	4,306,150.37
Michigan	733,395.19	820,420.46
Total	9,119,032.53	9,023,914.45

Daily Average Runs

The following table shows the daily average runs of the Pennsylvania, Lima and Kentucky oil fields for the past four years:

	1929	1930	1931	1932
January	51,749	75,907	53,939	53,501
February	51,833	79,256	55,163	.....
March	54,252	76,688	54,231	.....
April	58,444	84,536	54,914	.....
May	59,902	70,546	53,344	.....
June	58,833	75,430	54,110	.....
July	66,087	68,921	50,723	.....
August	66,087	54,291	51,503	.....
September	67,315	56,595	61,345	.....
October	76,093	58,179	65,595	.....
November	74,831	52,332	59,819	.....
December	74,561	53,999	61,835	.....

Daily Average Shipments

The following table gives daily average shipments from the Pennsylvania, Lima and other fields for the past four years:

	1929	1930	1931	1932
January	165,721	217,622	175,369	186,551
February	159,387	224,355	183,494	.....
March	161,474	228,846	189,508	.....
April	169,737	241,845	191,450	.....
May	184,281	248,382	199,247	.....
June	185,404	234,401	221,155	.....
July	194,763	207,094	211,632	.....
August	194,946	205,506	224,166	.....
September	201,214	193,999	217,537	.....
October	191,367	157,675	210,831	.....
November	202,743	146,638	196,425	.....
December	186,257	143,001	176,241	.....

Gross Stocks

In the following table will be found the gross stocks of the various lines of the Pennsylvania, Lima and Kentucky oil fields, including oil received from other lines at the close of each month for the past three years:

	1930	1931	1932
January	12,220,045	11,831,092	9,023,914
February	12,991,561	11,506,489	.....
March	13,247,317	11,012,162	.....
April	13,233,961	11,044,481	.....
May	13,052,953	10,738,239	.....
June	13,396,855	9,903,349	.....
July	13,268,562	9,569,849	.....
August	13,047,051	9,192,457	.....
September	12,812,018	8,492,431	.....
October	12,437,553	8,417,694	.....
November	11,851,380	8,830,386	.....
December	11,751,952	9,119,032	.....

The Illinois Field

The following table gives the report of the Illinois Pipe Line Co. in Illinois:

Gross stocks, Feb. 1	484,419.77
Runs from wells	476,649.97
Regular deliveries	224,321.04
Other deliveries	200,937.11

The amount of Illinois oil run by the Tide Water Pipe Co. in January was 21,527.15 bbls. Deliveries were 22,303.06 bbls. Adding these figures to those of the Illinois Pipe Line Co. makes the runs and deliveries as follows:

	Runs	Deliveries
1932—		
January	500,177.12	246,634.10
1931—		
January	468,429.04	669,573.19
February	429,284.54	461,262.85
March	424,638.23	356,662.26
April	421,814.98	282,532.65
May	433,231.80	332,513.95
June	510,805.78	320,258.13
July	520,009.38	289,219.05
August	476,623.56	393,231.06
September	492,183.83	323,012.50
October	498,124.13	325,834.95
November	470,302.63	281,258.43
December	515,771.28	306,623.19
1930		
January	543,287.95	498,293.93
February	548,416.33	414,536.59
March	631,944.49	469,119.53
April	530,074.22	509,304.46
May	605,147.37	504,069.84
June	572,662.57	468,658.81
July	604,529.54	388,454.47
August	594,642.12	375,742.43
September	457,001.11	371,691.43
October	478,442.12	320,688.71
November	422,794.68	355,403.13
December	556,418.78	363,719.55

Tide Water Pipe Co., Ltd., also delivered in January 293,024.35 bbls. Oklahoma oil.

AVERAGE DAILY IMPORTS OF CRUDE AND REFINED OIL AT PRINCIPAL UNITED STATES PORTS

Average barrels per day in 1931—	Atlantic Ports: Baltimore	Boston	New York	Philadelphia	Others	Total	Gulf Coast Ports: Galveston	New Orleans, Baton Rouge	Port Arthur, Sabine Pass	Tampa	Total	Total all ports
February	31,321	16,929	127,786	31,714	26,857	234,607	4,536	11,571	.....	536	16,643	251,250
March	27,646	18,935	141,160	26,290	21,129	238,161	4,065	2,580	.....	1,968	8,613	246,774
April	35,000	16,533	105,000	29,767	35,533	215,833	2,733	3,400	.....	.....	6,133	221,966
May	30,129	8,774	107,000	25,452	26,710	198,065	.....	2,000	.....	.....	2,000	200,065
June	30,067	16,833	111,767	27,000	20,833	200,500	3,300	5,500	2,167	1,333	12,300	212,800
July	26,387	11,226	104,678	29,323	21,773	193,387	6,903	7,419	4,194	.....	18,516	211,903
August	32,613	15,581	91,742	32,387	25,741	188,064	4,161	2,516	.....	3,162	9,839	197,903
September	27,067	7,267	106,867	20,099	22,967	184,267	4,833	8,333	.....	.....	13,166	197,433
October	53,710	14,484	100,774	26,742	40,645	236,355	6,097	6,871	2,097	1,838	16,903	253,258
November	48,033	28,800	51,667	28,600	12,967	170,067	3,933	10,833	3,033	1,367	19,166	189,233
December	20,258	16,806	121,807	31,645	34,258	224,774	1,968	4,355	.....	.....	6,323	231,097
January	19,161	8,161	104,065	24,194	34,903	190,484	4,871	7,226	3,096	1,484	15,677	206,161

AVERAGE DAILY RECEIPTS OF CALIFORNIA CRUDE AND REFINED OIL AT ATLANTIC AND GULF PORTS

Average barrels per day in 1931—	Atlantic Ports: Baltimore	Boston	New York	Philadelphia	Others	Total	Gulf Coast Ports: Galveston	New Orleans, Baton Rouge	Port Arthur, Sabine Pass	Tampa	Total	Total all ports
February	5,787	2,713	29,143	4,000	5,750	47,393	.....	.....	.....	.....	3,750	51,143
March	10,032	1,611	21,388	7,324	8,774	49,129	.....	.....	.....	.....	6,355	55,484
April	5,133	.....	19,200	16,500	10,067	50,900	.....	.....	.....	.....	4,000	54,900
May	4,452	3,064	19,903	11,226	6,258	44,903	.....	.....	.....	.....	2,355	47,258
June	4,267	.....	25,100	6,333	3,500	39,200	.....	.....	.....	.....	.....	39,200
July	6,774	1,194	24,612	11,065	9,902	53,548	.....	.....	.....	.....	1,335	54,903
August	3,452	.....	16,419	7,419	4,290	31,580	.....	.....	.....	.....	968	32,548
September	4,267	3,667	12,933	4,699	7,367	32,933	.....	.....	.....	.....	4,000	36,933
October	2,355	1,129	19,290	16,709	9,323	48,806	.....	.....	.....	.....	3,323	52,129
November	1,000	.....	22,500	11,567	.....	35,367	.....	.....	.....	.....	3,366	38,733
December	3,161	.....	22,484	8,839	6,032	46,516	.....	.....	.....	.....	7,742	48,258
January	3,871	1,710	14,483	3,774	5,710	29,548	.....	.....	.....	.....	.....	29,548

GROSS PRODUCTION OF CRUDE OIL IN THE UNITED STATES FOR 12 MONTHS

(In Barrels of 42 Gallons)

		California	Oklahoma	Texas	Kansas	Arkansas	Louisiana	Rocky Mts.	Eastern	Total
1931—										
February:	Month	14,930,932	13,531,980	18,957,571	3,341,016	1,402,492	1,981,616	2,747,024	3,129,000	60,021,631
	Daily average	533,248	483,285	677,057	119,322	50,089	70,772	98,108	111,750	2,143,630
March:	Month	16,344,842	14,457,487	22,453,619	3,498,598	1,469,245	2,061,576	2,898,035	3,374,000	68,747,502
	Daily average	527,898	536,377	724,310	112,858	47,395	66,502	93,485	108,839	2,217,655
April:	Month	15,803,541	16,215,990	26,887,717	3,381,880	1,412,220	2,008,021	2,901,870	3,272,000	72,384,239
	Daily average	526,785	559,206	896,257	109,396	47,074	66,934	96,729	109,100	2,412,508
May:	Month	16,448,960	17,332,967	28,705,684	3,341,366	1,446,274	2,232,563	3,098,419	3,190,000	75,800,133
	Daily average	530,612	559,157	926,086	107,786	46,654	72,018	99,949	102,900	2,445,166
June:	Month	15,641,436	16,678,200	29,139,833	3,175,440	1,344,450	1,850,511	2,936,200	3,166,000	73,932,070
	Daily average	521,381	555,940	971,327	105,848	44,815	61,684	99,540	105,533	2,466,068
July:	Month	16,093,322	16,430,080	33,827,213	3,089,832	1,337,535	1,715,730	2,905,909	3,241,000	78,650,671
	Daily average	519,139	539,680	1,091,200	99,673	43,595	55,345	93,739	107,774	2,538,078
August:	Month	15,668,984	9,517,279	32,279,816	3,141,333	1,165,569	1,584,444	3,807,143	3,167,000	69,331,558
	Daily average	505,451	307,009	1,041,284	101,333	37,599	51,111	90,553	102,161	2,236,502
September:	Month	15,180,610	7,946,330	28,981,525	3,147,030	1,138,380	1,641,384	2,761,320	3,032,000	64,429,089
	Daily average	506,020	264,896	966,051	104,901	37,946	54,713	92,041	121,067	2,180,968
October:	Month	15,651,983	12,951,893	30,736,173	3,177,066	1,172,389	1,822,255	2,797,597	3,900,000	72,198,356
	Daily average	504,903	417,803	991,134	102,486	37,819	58,782	90,247	125,807	2,328,979
November:	Month	14,997,700	16,430,730	28,860,561	3,131,670	1,130,700	1,851,577	2,706,390	3,039,000	72,748,328
	Daily average	499,923	547,691	962,018	104,389	37,690	61,719	90,213	121,300	2,424,944
December:	Month	15,560,934	16,598,299	27,767,651	3,198,642	1,082,148	1,971,317	2,816,759	3,645,000	72,641,300
	Daily average	501,967	535,429	903,360	103,182	34,903	63,607	90,863	117,581	2,343,361
1932—										
January:	Month	15,532,141	13,695,986	25,744,105	3,169,347	1,064,385	1,696,017	2,822,023	3,566,000	67,290,004
	Daily average	501,037	446,806	830,455	102,237	34,335	54,710	91,033	115,037	2,170,645
Total 12 months		187,875,435	174,549,881	334,333,468	38,693,210	15,115,837	22,417,516	34,248,599	41,022,000	848,254,946
Daily average		514,727	478,219	915,979	106,009	41,413	61,418	93,831	112,389	2,323,956